DECLARATION STATEMENT

SITE NAME AND LOCATION

Scientific Chemical Processing (EPA ID# NJD070565403), Borough of Carlstadt, Bergen County, New Jersey, Operable Unit 3

STATEMENT OF BASIS AND PURPOSE

This decision document presents the Selected Remedy for off-property and deep groundwater contamination at the Scientific Chemical Processing Site located in the Borough of Carlstadt, Bergen County, New Jersey. The Selected Remedy was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act, as amended, and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan. This decision is based on the Administrative Record file for the Site.

The State of New Jersey concurs with the Selected Remedy.

ASSESSMENT OF THE SITE

The response action selected in this Record of Decision (ROD) is necessary to protect public health or welfare or the environment from actual or threatened release of hazardous substances from the Site into the environment.

DESCRIPTION OF THE SELECTED REMEDY

The response action described in this document addresses off-property and deep groundwater contamination at the Scientific Chemical Processing Site. It represents the third and final remedial phase, or operable unit, for the Site. A ROD issued for the first operable unit (OU1) in September 1990 selected an interim remedy to address contaminated on-property soil and shallow groundwater at the Site. A ROD for the second operable unit (OU2) was issued in August 2002 and selected a final remedy for the on-property soil and shallow groundwater. This ROD for the third operable unit (OU3) addresses off-property and deep groundwater contamination.

The major components of the selected remedy are:

- Treatment of contaminated off-property and deep groundwater using in-situ treatment technologies, through the injection of a substance or substances into the groundwater to cause or enhance the breakdown of the contaminants of concern to less toxic forms;
- Monitored natural attenuation both during and after active treatment; and
- Institutional controls to assure that the remedy remains protective until cleanup goals are achieved.

DECLARATION OF STATUTORY DETERMINATIONS

Part 1: Statutory Requirements

The Selected Remedy is protective of human health and the environment, complies with federal and state requirements that are applicable or relevant and appropriate to the remedial action, is cost-effective, and utilizes permanent solutions and alternative treatment or resource recovery technologies to the maximum extent practicable.

Part 2: Statutory Preference for Treatment

The Selected Remedy satisfies the statutory preference for treatment as a principal element of the remedy.

Part 3: Five-Year Review Requirements

EPA expects that it will take more than five years for the remedy to achieve the remedial action objectives and cleanup goals for the groundwater. In addition, the OU2 remedy resulted in hazardous substances, pollutants or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure. As such, statutory five-year reviews are already being conducted to ensure the remedies for the Site are protective of human health and the environment. The next review is scheduled for completion in December 2012.

ROD DATA CERTIFICATION CHECKLIST

The following information is included in the Decision Summary section of this Record of Decision. Additional information can be found in the Administrative Record file for the Site.

$ Chemicals of concern and their respective concentrations may be found in the ASummary of Site Characteristics@ section.

$ Baseline risk represented by the chemicals of concern may be found in the ASummary of Site Risks@ section.

$ A discussion of source materials constituting principal threats may be found in the APrincipal Threat Waste@ section.

$ Current and reasonably anticipated future land use assumptions are discussed in the ACurrent and Potential Future Site and Resource Uses@ section.

$ Estimated capital, annual operation and maintenance, and total present worth costs are discussed in the ADescription of Remedial Alternatives@ section.

- Key factors that led to selecting the remedy (i.e., how the Selected Remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, emphasizing criteria key to the decision) may be found in the "Comparative Analysis of Alternatives" and "Statutory Determinations" sections.

Walter E. Mugdan, Director
Emergency & Remedial Response Division
Environmental Protection Agency, Region 2

Sept. 27, 2012
Date

DECISION SUMMARY

Operable Unit Three

Scientific Chemical Processing Site

Borough of Carlstadt, Bergen County, New Jersey

United States Environmental Protection Agency

Region II

September 2012

TABLE OF CONTENTS

SITE NAME LOCATION AND DESCRIPTION

The six-acre Scientific Chemical Processing (SCP) Site is located at 216 Paterson Plank Road in Carlstadt, New Jersey. The Site is a corner property, bounded by Paterson Plank Road on the south, Gotham Parkway on the west, Peach Island Creek on the north and an industrial facility on the east (Figure 1). The land use in the vicinity of the Site is classified as light industrial by the Borough of Carlstadt. The establishments in the immediate vicinity of the Site include a bank, horse stables, warehouses, freight carriers, and service sector industries. There is a residential area located approximately 1.2 miles northwest of the Site.

SITE HISTORY AND ENFORCEMENT ACTIVITIES

Early Operations

The land on which the former SCP property is located was purchased in 1941 by Patrick Marrone, who used the land for solvent refining and solvent recovery. Mr. Marrone eventually sold the land to a predecessor of Inmar Associates, Inc. Aerial photographs from the 1950s, 1960s and 1970s indicate that drummed materials were stored on the property. On October 31, 1970, the Scientific Chemical Processing Company leased the property from Inmar Associates. SCP used the property for processing industrial wastes from 1971 until the company was shut down by court order in 1980.

While in operation, SCP received liquid byproduct streams from chemical and industrial manufacturing firms, and then processed the materials to reclaim marketable products which were sold to the originating companies. In addition, liquid hydrocarbons were processed to some extent, and then blended with fuel oil. The mixtures were typically sold back to the originating companies or to cement and aggregate kilns as fuel. SCP also received other wastes, including paint sludge, acids and other unknown chemical wastes.

Site Discovery, State and Federal Response Actions

In 1983, the Site was placed on the National Priorities List. Between 1983 and 1985, NJDEP required the property owner to remove approximately 250,000 gallons of wastes stored in tanks which had been abandoned at the Site.

In May 1985, EPA assumed the lead role in the response actions, and issued notice letters to more than 140 Potentially Responsible Parties (PRPs). EPA offered the PRPs an opportunity to perform a Remedial Investigation and Feasibility Study (RI/FS) for the Site. The purpose of an RI/FS is to determine the nature and extent of contamination at a site, and then to develop remedial alternatives to address the contamination. In September 1985, EPA issued an Administrative Order on Consent to 108 PRPs who had agreed to conduct the RI/FS. Subsequently, in October 1985, EPA issued a Unilateral Order to 31 PRPs who failed to sign the Consent Order. The Unilateral Order required the 31 PRPs to cooperate with the 108 consenting PRPs on the RI/FS. In the fall of 1985, EPA also issued an Administrative Order to Inmar Associates, requiring the company to remove and properly dispose of the contents of five tanks containing wastes contaminated with Polychlorinated Biphenyls (PCBs) and numerous other hazardous substances. Inmar removed four of the five tanks remaining on the property in 1986. The fifth tank was not removed at the time because it contained high levels of PCBs and other contaminants, and disposal facilities capable of handling those wastes were not available. The fifth tank and its contents were subsequently removed by the PRPs in February 1998 and disposed of at an EPA-approved facility.

The PRPs initiated the RI/FS in April 1987, and it was completed in March 1990. The RI focused on the most heavily contaminated zone at the Site, which included the contaminated soil, sludge, and shallow groundwater within the SCP property (hereinafter, this zone will be referred to as the "Fill Area"). The RI also included sampling of deeper groundwater areas, both on and off the SCP property, and of surface water and sediment from Peach Island Creek. The investigation found that contamination from the Fill Area had impacted these additional areas.

The FS indicated that, although there seemed to be several potential methods or combinations of methods to remedy the Fill Area, there were uncertainties regarding the relative effectiveness of the various technologies. Consequently, EPA made a decision that treatment alternatives needed further assessment. In the meantime, however, measures were needed to contain and prevent exposure to the Fill Area contaminants. As such, an interim remedy for the on-property soil and shallow groundwater was selected in a September 1990 Record of Decision (ROD).

EPA typically addresses sites in separate phases and/or operable units. In developing an overall strategy for the Site, EPA has identified the interim Fill Area remedy as Operable Unit 1 (OU1), the final Fill Area remedy as OU2, and the off-property and deep groundwater remedy, which is the subject of this ROD, as OU3. Contamination in the adjacent Peach Island Creek will be addressed as part of another Superfund site, Berry's Creek. Peach Island Creek is a tributary to Berry's Creek.

Interim Remedy: Soil and Shallow Groundwater on Property (OU1)

The goals of the interim remedy selected for OU1 were to prevent exposure to contaminated soil and sludge in the Fill Area and to prevent the contaminated groundwater within the Fill Area from migrating off-property. The interim remedy was constructed from August 1991 through June 1992 by the PRPs for the Site, with EPA oversight, pursuant to a Unilateral Administrative Order, dated September 28, 1990, and consisted of the following:

$ A vertical containment wall comprised of a soil-bentonite slurry with an integral high density polyethylene (HDPE) membrane surrounding the Fill Area and keyed into an underground clay layer;

$ A sheet pile retaining wall along Peach Island Creek;

$ An HDPE horizontal infiltration barrier covering the property;

$ An extraction system for shallow groundwater within the containment area with discharge to an above-ground storage tank for off-site disposal;

$ A chain link fence around the property to restrict access; and

$ Regularly scheduled groundwater sampling, plus monitoring of the interim remedy to assure it remained effective until a final remedy was selected.

The interim remedy has effectively mitigated the risks from direct contact with Fill Area contamination and the spread of Fill Area contamination to deeper groundwater and Peach Island Creek since its implementation in 1992.

Final Remedy: Soil and Shallow Groundwater on Property (OU2)

While implementing the OU1 remedy, EPA continued to oversee additional RI/FS work which would provide information to select a final remedy for the Fill Area, as well as a remedy for the off-property and deep groundwater. A ROD selecting the Final Remedy for the Fill Area (OU2) was signed in August 2002. The major elements of the selected remedy included:

- Treatment of a Hot Spot area of contamination to reduce concentrations of volatile organic compounds, followed by soil stabilization of the area using cement and lime. If the treatment did not prove effective, the ROD specified that excavation of the Hot Spot area, with off-site disposal, would occur;

- Installation of a 2-foot thick “double containment” cover system over the entire Fill Area;

- Improvement of the existing, interim groundwater recovery system; and

- Improvement of the existing sheet pile wall along Peach Island Creek.

The OU2 remedy was implemented by the PRPs, with EPA oversight, pursuant to a Consent Decree entered in September 2004. Design of the remedy was completed in June 2007 and construction of the remedy was initiated in April 2008. Efforts to stabilize the Hot Spot area of contamination were not successful. As such, sludge and soil from the area was excavated and disposed of at an EPA-approved off-site disposal facility.

Implementation of the OU2 remedy was completed in October 2011. The groundwater recovery system is operating and regular maintenance is being conducted by the PRPs.

Off-Property and Deep Groundwater (OU3)

OU3 includes groundwater located outside of the boundaries of the former SCP property, as well as groundwater beneath the property, but deeper than the limits of the OU2 remedy (i.e., below the shallow groundwater). Investigation of OU3 groundwater has been ongoing since the initiation of the RI for the Site in 1987. An Interim Data Report was submitted by the PRPs in 1997, and an Off-Property Groundwater Investigation Report was submitted in May 2003.

After reviewing the May 2003 report, EPA determined that additional investigation was needed to further define the nature and extent of groundwater contamination in the till and bedrock aquifers. The scope of the additional investigation was agreed to at a meeting with EPA in November 2006, and the associated fieldwork was conducted between March and July 2007. The Final Off-Property Groundwater Investigation Report for Operable Unit 3 (the Final RI for OU3) was submitted by the PRPs in July 2009.

In June 2008, the PRPs submitted a remedial action objectives and remedial alternatives (RAO/RA) report, identifying a preliminary list of remedial technologies for OU3. The RAO/RA report also proposed that bench and, possibly, pilot-scale studies be conducted to test the efficacy of certain remedial technologies for use at this Site.

Additional groundwater investigations were performed in advance of the bench and pilot-scale treatability studies that were conducted to support the OU3 FS. This additional investigation work was conducted in December 2009 and January 2010 in accordance with an April 2009 work plan for additional groundwater delineation submitted by the PRPs. The results were reported in an OU3 FS Phase 1 Treatability Studies report dated September 2010, which proposed further delineation activities and provided a work plan for an enhanced anaerobic bioremediation pilot test that is ongoing at the Site.

The OU3 RI/FS was completed in July 2012. The results of the OU3 RI are summarized below, and form the basis for the development of the FS report. Both documents, as well as the OU3 Human Health Risk Assessment, can be found in the Administrative Record for the Site.

HIGHLIGHTS OF COMMUNITY PARTICIPATION

The RI/FS Reports and the Proposed Plan for OU3 were released to the public for comment on August 2, 2012. These documents were made available to the public in the administrative record file maintained at the William E. Dermody Public Library, 420 Hackensack Street, Carlstadt, New Jersey and at the EPA Records Center, Region II, 290 Broadway, New York, New York. The notice of availability for these documents was published in the South Bergenite on August 2, 2012. A public comment period was held from August 3, 2012 to September 4, 2012.

In addition, on August 9, 2012, a public meeting was conducted at the Carlstadt Borough Hall, 500 Madison Street, Carlstadt, New Jersey, to discuss the findings of the RI/FS and to present EPA's Proposed Plan to local officials and the community. At this meeting, EPA representatives answered questions about the groundwater contamination and remedial alternatives.

Comments which were received by EPA at the public meeting and during the public comment period are summarized and addressed in the Responsiveness Summary (see Appendix V).

SCOPE AND ROLE OF RESPONSE ACTION

As stated previously, EPA is addressing this Site in three operable units, two of which have already been implemented. OU1 provided an interim infiltration barrier, slurry wall, groundwater collection system, and off-site disposal of contaminated groundwater. OU2 improved upon and made permanent the OU1 remedy. It constituted the final remedy for the Fill Area of the Site. OU3, the final operable unit and the subject of this ROD, addresses contaminated groundwater in the deeper aquifers where contamination extends off-property and below the OU2 containment area.

SUMMARY OF SITE CHARACTERISTICS

The stratigraphy at the Site consists of the following layers, in descending order with depth (see Figure 2):

- Man-made fill (3 to 10 feet thick)
- Marine and marsh “meadow mat” (0 to 4 feet thick)
- Glaciolacustrine varved clay unit, including an upper stiff bedded unit and a lower soft plastic unit (0 to 20 feet thick)
- Glacial till, including a soft upper unit (0 to 17 feet thick) and a very hard lower lodgement till (0 to 30 feet thick)
- Passaic Formation bedrock consisting of siltstones and mudstones with occasional interbeds of sandstones.

The geologic layers that are most relevant to OU3 include the glaciolacustrine varved clay unit, which serves as a confining layer, and the underlying glacial till and bedrock aquifers. The till and bedrock aquifers are designated as Class IIA groundwater by the State of New Jersey, which means they are potential sources of drinking water. However, no wells in the affected area are used for potable water purposes.

Groundwater in the vicinity of the Site generally flows to the north from the property. However, the flow direction and water levels are significantly influenced by the presence of several nearby extraction wells used for non-residential, non-potable purposes. These wells operate during the week and then sit idle during the weekend. Consequently, the groundwater flow direction shifts during the weekend, and tends toward the northwest or even the south when some or all of the extraction wells are not operating.

Sampling Results

The results of the RI are summarized in a final report dated July 2009. Additional sampling conducted since that time has been incorporated into the FS for OU3. The primary contaminants of concern in groundwater at the Site include Volatile Organic Compounds (VOCs), predominantly tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene (DCE), and vinyl chloride, localized areas of aromatic hydrocarbons, including benzene, and 1,4-dioxane.

There are two distinct areas of contamination in the OU3 groundwater, which are described separately below. The two areas can be seen on Figure 3, and a summary of the sampling results from the till and bedrock aquifers can be found on Figures 4 and 5.

Northern Area Contamination

The primary contaminants of concern in the northern area of contamination are the VOCs mentioned previously. Concentrations decrease substantially with increasing horizontal and vertical distance from the former SCP property. For example, the highest concentrations of total VOCs in the bedrock aquifer, approximately 3,000 parts per billion (ppb), were found in Monitoring Well -13R (MW-13R), which is located adjacent to the northwest corner of the former SCP property. Total VOC concentrations decrease to trace levels (i.e., less than 1 ppb) in the bedrock aquifer by 1,000 feet away horizontally. Concentrations also decline vertically, with only trace total VOC concentrations detected in MW-23R, located near, but deeper than, MW-13R.

Similarly, the highest concentration of total VOCs detected in the till aquifer was approximately 5,500 ppb in MW-5D, which is located in the northwest corner of the property, and draws water from beneath the OU2 containment remedy. Total VOC concentrations in the till aquifer decline to 718 ppb in MW-20D, located approximately 500 feet north of the property, and to 5 ppb in MW-26D, located approximately 950 feet northeast of the property. Total VOC concentrations also decline to 51 ppb in MW-25D, approximately 1,000 feet north of the property.

Southern Area Contamination

The primary contaminant of concern that defines the contamination to the south of the property is 1,4-dioxane, though other contaminants, including benzene and 1,1-dichloroethane, are also present at elevated concentrations. 1,4-dioxane has been detected in groundwater in the southern area at concentrations ranging from 5 ppb to 6,300 ppb. The highest concentrations were observed in the soft till, and were an order of magnitude higher than in groundwater samples collected in the deeper, lodgement till. 1,4-dioxane has not been found above concentrations of concern in the bedrock aquifer.

Summary of Groundwater Concentration Trends

Recent concentrations of contaminants in off-property groundwater are generally below historic highs. The containment measures implemented as part of the OU1 and OU2 remedies are likely partially responsible for the decline in concentrations over time. The OU1 and OU2 remedies effectively mitigated the movement of contamination from the Fill Area to the deeper and off-property groundwater. However, natural attenuation processes are also contributing to the continued decline in concentrations of OU3 groundwater contamination over time.

Natural attenuation refers to processes that reduce the mass, toxicity, mobility, volume, and/or concentration of chemicals through natural processes, such as biodegradation, dispersion, dilution, sorption, volatilization, and/or chemical or biological stabilization, transformation, or destruction of contaminants. Appendix A of the 2012 FS report for OU3 contains a formal natural attenuation evaluation. The evaluation documents that natural attenuation processes are occurring in the deep groundwater at the Site, and that the primary in-situ process contributing to the ongoing natural attenuation is biodegradation (i.e., the natural breakdown of chemicals through biological processes).

Multiple lines of evidence exist which show that natural attenuation processes are occurring at the Site. These include:

- Declining concentrations of VOCs at some of the wells;
- The presence of ethene, ethane and other daughter products of the chlorinated ethene and chlorinated ethane degradation sequences, which provides evidence that dechlorination is occurring;
- Geochemical data which suggests that groundwater conditions are conducive to anaerobic biodegradation of site-related contaminants; and
- Use of EPA's monitored natural attenuation screening criteria "scorecard" found that the majority of wells in the till and bedrock aquifers show evidence of anaerobic biodegradation.

The decline in concentrations over time can be seen by looking at the data in Figures 4 and 5. Of the site-related contaminants, only 1,4-dioxane does not naturally biodegrade.

CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

Land Use:

The land use at the Site and in the vicinity of the Site is classified as light industrial by the Borough of Carlstadt. The establishments in the immediate vicinity of the Site include a bank, horse stables, warehouses, freight carriers, and service sector industries. There is a residential area located approximately 1.2 miles northwest of the Site.

Groundwater Uses:

The natural water table is found in the shallow aquifer at a depth of approximately two feet below the land surface. Beneath the shallow aquifer is a clay layer, which is underlain by the till aquifer. Underneath the till aquifer is the bedrock aquifer.

Both the till and bedrock aquifers are designated as Class IIA groundwater by the State of New Jersey, which means they are potential sources of drinking water. However, no wells in the affected area are currently used for potable water purposes. While there are no current completed exposure pathways to OU3 groundwater, future exposure pathways are associated with potential groundwater extraction and use via ingestion, inhalation and dermal contact routes.

SUMMARY OF SITE RISKS

As part of the RI/FS, a baseline risk assessment was conducted to estimate the current and future effects of contaminants on human health and the environment. A baseline risk assessment is an analysis of the potential adverse human health and ecological effects of releases from hazardous substances from a Site in the absence of any actions or controls to mitigate such releases, under current and future land, ground water, surface water, and sediment uses. The baseline risk assessment generally includes a human health risk assessment and an ecological risk assessment. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action.

This section of the ROD summarizes the results of the baseline human health risk assessment (BHHRA) that was conducted for the Site. An ecological risk assessment was determined to be unnecessary for OU3. The OU2 remedy specified that ecological risks would be addressed as part of the OU3 remedy. At that time, Peach Island Creek was to be addressed as part of the Site. However, contamination in the creek, and any associated ecological risks, will now be addressed as part of the Berry's Creek Superfund site.

Human Health Risk Assessment

A BHHRA is an analysis of the potential adverse human health effects caused by hazardous substance exposure in the absence of any actions to control or mitigate exposure under current and future land uses. The BHHRA for OU3 considered exposure to Chemicals of Potential Concern in the bedrock and till groundwater aquifers assuming no remediation and no institutional controls.

A four-step human health risk assessment process was used for assessing site-related cancer risks and non-cancer health hazards. The four-step process is comprised of:

- *Hazard Identification* – identifies the contaminants of concern at a site based on several factors such as toxicity, frequency of occurrence, and concentration;

- *Exposure Assessment* – estimates the magnitude of actual and/or potential human exposures, the frequency and duration of these exposures, and the pathways by which humans are potentially exposed (i.e., ingesting contaminated groundwater);

- *Toxicity Assessment* – determines the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure (dose) and severity of adverse effects (response); and

- *Risk Characterization* – summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of site-related risks. During this step, contaminants with concentrations that exceed federal Superfund guidelines for acceptable exposure are identified. These guidelines are 10^{-4} to 10^{-6}, or one-in-ten-thousand to one-in-a-million excess occurrences, for cancer, and a Hazard Index (HI) of greater than 1.0 for non-cancer health hazards. Contaminants with concentrations that exceed these guidelines are then considered chemicals of concern (COCs) for the site and are typically those that will require remediation. The uncertainties associated with the risk calculations are also evaluated under this step.

Each of these steps, as applied to OU3 of this Site, is described below.

Hazard Identification

All OU-3 groundwater data collected since December of 2006 was considered in the screening of COCs. Potential COCs were screened against residential tap water concentrations associated with a risk level of 1 x 10^{-6} or a chemical specific Hazard Quotient (HQ) = 0.1. All known human carcinogens were selected as COCs regardless of risk level. The BHHRA identified a wide range of volatile organic compounds, semi-volatile organic compounds and metals as COCs. The main risk driver COCs were found to be 1,4-dioxane, DCE, PCE, and TCE.

Exposure Assessment

Table 1 provides the Site Conceptual Site Model for exposures to OU3 groundwater. As has been noted, no wells in the affected area are currently used for potable water purposes, and the land use at the Site and in its vicinity is currently zoned as light industrial. Therefore, the BHHRA focused on future risks. The following potential future use scenarios were evaluated:

- Future Adult/Child Residents: ingestion of, dermal contact with, and inhalation of vapors from OU3 groundwater.

- Industrial Workers: ingestion of and dermal contact with OU3 groundwater; qualitative evaluation of inhalation of vapors from OU3 groundwater.

Exposure Point Concentrations (EPCs) in groundwater were estimated using either the maximum detected concentration of a contaminant, or determined statistically by calculating the upper confidence limit (UCL) of the average concentration. Chronic daily intakes were calculated based on the reasonable maximum exposure (RME), which is the highest exposure reasonably anticipated to occur at the Site. The RME is intended to represent a conservative exposure scenario that is still within the range of possible exposures. Central tendency exposure (CTE) assumptions, which represent typical, average exposures, were also developed. Table 2 presents the OU3 COC EPCs that were used, the range of detected concentrations for the COCs, the frequency of detection, and the statistical method used to determine the EPC. A complete summary of all exposure scenarios can be found in the BHHRA.

Toxicity Assessment

Under current EPA guidelines, the likelihood of carcinogenic risks and non-cancer hazards due to exposure to site-related chemicals are considered separately. Consistent with current EPA policy, it was assumed that the toxic effects of the site-related chemicals would be additive. Thus, cancer risks and non-cancer hazards associated with exposures to individual COCs were summed to indicate the potential cancer risks and non-cancer hazards associated with mixtures, respectively.

Toxicity data for the human health risk assessment were provided by the Integrated Risk Information System (IRIS) database, the Provisional Peer Reviewed Toxicity Values, or another source that is identified as an appropriate reference for toxicity values consistent with EPA's directive on toxicity values. This information is presented in Tables 3a and 3b (non-cancer toxicity data summary) and Tables 4a and 4b (cancer toxicity data summary). Additional toxicity information for all COPCs is presented in the BHHRA.

Risk Characterization

Quantitative estimates of carcinogenic risks and non-carcinogenic hazards were calculated as part of the risk characterization. The risk characterization evaluates potential health risks based on estimated exposure intakes and toxicity values. For carcinogens, risks are estimated as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to a potential carcinogen. For non-carcinogens hazards are calculated by comparing an exposure level over a specified time period (e.g., lifetime) with an RfD derived for a similar exposure period.

To assess the overall non-carcinogenic effects posed by more than one contaminant, the EPA has developed the Hazard Quotient (HQ) and Hazard Index (HI). The HQ is the ratio of the chronic daily intake of a COPC to the reference dose for the chemical. The reference dose is an estimate of a daily exposure level for the human population, including sensitive sub-populations, that is thought to be safe over a lifetime of exposure. The HQs are summed for all COPCs within an exposure pathway (e.g., ingestion of soil) and across pathways to determine the HI. When the HI exceeds 1, there may be a concern for potential non-carcinogenic health effects if the COPCs in question are believed to cause similar toxic effects.

For carcinogens, risks are generally expressed as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to a potential carcinogen. The excess lifetime cancer risk was determined for each COPC by multiplying the COPC-specific exposure dose by the cancer slope factor for oral or dermal exposures. The resulting cancer risk estimates are expressed in scientific notation as a probability (e.g., 1×10^{-6}). The risks of individual COPCs are summed for each pathway to develop a total risk estimate. An excess lifetime cancer risk of 1×10^{-4} indicates that one additional incidence of cancer may occur in a population of 10,000 people who are exposed under the conditions identified in the assessment. The range of acceptable risk is 1×10^{-4} to 1×10^{-6} of an individual developing cancer over a 70-year lifetime from exposure to the COPC(s) under specific exposure assumptions. Therefore, sites with carcinogenic risk below the risk range for a reasonable maximum exposure do not generally require cleanup based upon carcinogenic risk under the NCP.

A summary of the carcinogenic risks and non-cancer health hazards associated with the contaminants for each exposure pathway is contained in Tables 5a through 5c.

Summary of Risks to Future Residents

The carcinogenic risk calculated for future adult residents under RME conditions was 3×10^{-3} (three in 1,000), which exceeds the acceptable risk range of 10^{-4} (one in 10,000) to 10^{-6} (one in 1,000,000). The risk is due primarily to ingestion of 1,4-dioxane (77%) and TCE (13%) in the groundwater. The carcinogenic risk calculated for future child residents under RME conditions was 2×10^{-3} (2 in 1,000), which is due primarily to the ingestion of 1,4-dioxane (45%) and TCE

(41%) in the groundwater. The total estimated future child cancer risk under CTE conditions was calculated to be $1x10^{-3}$ (one in 1,000), which still exceeds the risk range.

The non-cancer Hazard Index (HI) calculated for future adult residents was 54 under RME conditions and 25 under CTE conditions. Both of these exceed the goal of protection of an HI of less than 1. The primary COPCs in groundwater contributing to the total HI are 1,4-dioxane, TCE and DCE.

For future child residents, the total HI was calculated to be 125 under RME conditions and 63 under CTE conditions, due primarily to ingestion of 1,4-dioxane, DCE, TCE and PCE in groundwater. Again, the overall HI is greater than the goal of protection of an HI of less than 1 for both the RME and CTE exposures.

Carcinogenic risks associated with dermal exposure to OU3 groundwater were found to be within the acceptable risk range, but the HI was found to be greater than 1 for dermal exposure to TCE in the groundwater. An evaluation of cancer risks and non-cancer hazards associated with showering were found to be below the cancer risk range and an HI of 1 for potential future residents.

Summary of Risks to Industrial Workers

Under future exposure conditions, the sum of all RME cancer risks for the adult industrial/ commercial worker was calculated to be $9x10^{-4}$ (9 in 10,000), which exceeds the acceptable risk range. Estimated risks are primarily driven by ingestion of 1,4-dioxane (78%) and TCE (13%) in groundwater. The total estimated cancer risk under CTE conditions was calculated to be $4x10^{-4}$ (4 in 10,000), which is within the upper bounds of the acceptable risk range.

The total estimated non-cancer HI for future industrial/ commercial workers was calculated to be 19 under RME conditions and 10 under CTE conditions, due primarily by the ingestion of TCE in groundwater. The overall HI is greater than the goal of protection of an HI of less than 1 under both RME and CTE exposure conditions.

Cancer risks and non-cancer hazards associated with dermal exposure to OU3 groundwater were found to be within the acceptable risk range and below an HI of 1 for this scenario. Since the evaluation of cancer risks and non-cancer hazards associated with showering were found to be below the cancer risk range and an HI of 1 for potential future residents, this pathway was not evaluated qualitatively for the industrial/commercial worker scenario (since any associated risks/ hazards would be less).

Uncertainties

The procedures and inputs used to assess risks in this evaluation, as in all such assessments, are subject to a variety of uncertainties. The main sources of uncertainty in the BHHRA are described below.

Uncertainty in environmental sampling and analysis can arise in part from the potentially uneven distribution of contaminants in the media sampled. The sampling locations may not accurately reflect the range, frequency, and distribution of contaminants at the Site. There are also uncertainties associated with the analytical methods and instruments used in the analysis of the samples. These uncertainties are generally likely to have a low impact on the risk assessment.

The selection of COCs can also lend uncertainty to the risk assessment, but the selection process is generally conservative, so it is unlikely that chemicals that should be COCs are overlooked. At this Site, PCE, TCE, DCE and 1,4-dioxane were retained as COCs in groundwater. However, several chemicals were not evaluated in the BHHRA based on a lack of toxicity values. The lack of toxicity values may result in a potential underestimate of cancer risks and non-cancer health hazards.

Uncertainties can also be associated with the selection of exposure points and pathways and the estimation of EPCs. At this Site, the calculation of EPCs is based on the calculation of UCLs. The RME assumptions incorporated in the BHHRA are intended to be conservative and may overestimate risk.

Uncertainties are also associated with the toxicity information used to conduct the risk assessment. The availability and quality of toxicity data affect the ability of experts to derive toxicity criteria and the quality/quantity of the toxicity criteria that are derived. Uncertainties in toxicological data occur in extrapolating both from animals to humans and from high to low doses of exposure, as well as from the difficulties in assessing the toxicity of a mixture of chemicals. These uncertainties are addressed by making conservative assumptions concerning risk and exposure parameters throughout the assessment. As a result, the risk assessment provides upper bound estimates of the risks to populations near the Site and is not likely to underestimate actual risks related to the Site.

More specific information concerning public health risks, including a quantitative evaluation of the degree of risk associated with various exposure pathways, is presented in the BHHRA report.

REMEDIAL ACTION OBJECTIVES

Remedial Action Objectives are specific goals to protect human health and the environment. These objectives are based on available information and standards such as applicable or relevant and appropriate requirements (ARARs).

Based on the human health risk assessment, the primary contaminants of concern in the deep and off-property groundwater are VOCs, aromatic hydrocarbons, and 1,4-dioxane. There are no current completed exposure pathways to OU3 groundwater, but future exposure pathways are associated with potential groundwater extraction and use via ingestion, inhalation and dermal contact routes. The vapor intrusion pathway is not a concern due to the depth of the OU3 groundwater. The relatively clean shallow groundwater (5 to 10 feet below ground surface), as well as the clay layer that is present beneath it, would effectively block the potential migration of volatile contaminants from the deeper groundwater (more than 30 feet below ground surface) to the surface, as is documented in the January 2008 Five-Year Review Report for the Site.

The following remedial action objectives address the human health risks and environmental concerns posed at the Site:

- Prevent exposure to contaminated groundwater above acceptable risk levels;
- Prevent or minimize future migration of contaminants of concern in the groundwater; and
- Restore groundwater quality to the lower of the federal drinking water standards or the New Jersey Groundwater Quality Standards (NJGWQSs).

Table 6 lists the cleanup goals for the contaminants of concern in OU3 groundwater. The cleanup of the Site is based on remediating the contaminated groundwater to within EPA's acceptable cancer risk range for a reasonable maximum exposure if the groundwater were utilized in the future for residential purposes. The cleanup goals also have to be consistent with federal drinking water standards and NJGWQSs. The cleanup goals listed in Table 6 are based on the NJGWQSs, and are consistent with federal and state guidance.

DESCRIPTION OF REMEDIAL ALTERNATIVES

Remedial alternatives for the off-property and deep groundwater are presented below. Potential applicable technologies were initially identified and screened using effectiveness, implementability and cost as criteria, with an emphasis on the effectiveness of the alternative. Those technologies that passed the initial screening were then assembled into three remedial alternatives which were fully evaluated in the FS.

The time frames below for construction do not include the time to design the remedy or to procure necessary contracts.

Alternative 1 – No Action

Regulations governing the Superfund program require that the "no action" alternative be evaluated generally to establish a baseline for comparison with other alternatives. Under this alternative, EPA would take no action at the Site to prevent exposure to the groundwater contamination.

Total Capital Cost	$0
Total Operation and Maintenance	$0
Total Present Worth Cost	$0
Estimated Timeframe	None

Alternative 2 – In-Situ Treatment, Monitored Natural Attenuation, and Institutional Controls

This alternative would treat the contamination in the groundwater directly, through the injection of a substance, or substances, designed to cause or enhance the breakdown of the contaminants of concern to less toxic forms.

As described above, there are two distinct areas of contamination for OU3. A bench-scale test was conducted on the southern portion of the plume and a long-term, pilot-scale test is nearing completion in the northern portion of the plume. Both tests indicate that in-situ treatment technologies can effectively remediate the contamination that is present in the OU3 groundwater.

Based on the test results, it is anticipated at this time that enhanced anaerobic bioremediation (EAB) would be utilized to treat the contaminants in the northern portion of the plume and that in-situ chemical oxidation (ISCO) would be used on the southern portion. To arrive at the cost estimates provided above, the following assumptions were made in the FS (see Figure 6 for a schematic of this alternative):

Northern Area

- Treatment using EAB through the injection of lactate into the till aquifer;
- 51 injection wells were assumed, with 9 to be located on-property and the rest located off of the former SCP property; and
- Off-property injections of lactate were assumed to occur quarterly for 5 years, while on-property injections were assumed to continue for up to 30 years.

Southern Area

- Based on the bench-scale tests that were conducted, treatment using ISCO through the injection of a combination of sodium persulfate and sodium hydroxide into the aquifer;
- 20 injection wells were assumed, with 7 to be located on-property and the rest located off of the former SCP property; and
- A total of 3 injections were assumed, over a period of 3 to 5 years.

The details of the in-situ treatment technology to be used in each area, including the substances to be injected, the number of injection points, the extent of the treatment zone, and the timeframes for treatment would be refined during the remedial design, and may change significantly based on the final results of the pilot study and results from the pre-design investigation. The design assumptions will be further evaluated throughout the implementation of the remedy, and modified as necessary. However, the use of an in-situ treatment technology or technologies is expected to remain an appropriate remedy for OU3.

During and after the initial treatment period, MNA would be used to complete the remediation of OU3 groundwater. MNA addresses contaminated groundwater through ongoing natural attenuation processes accompanied by verification monitoring. A description of natural attenuation and the evidence that it is occurring at this Site is included in the Summary of Site Characteristics section of this ROD.

Institutional controls would also be part of this alternative. A deed notice is already in place which restricts the placement of groundwater wells on the former SCP property itself. In addition, a Classification Exception Area/Well Restriction Area (CEA/WRA) would be established to prevent the installation of wells within the affected area until the remediation is complete, and the need for other institutional controls would be evaluated during the design of the remedy. Because this remedy would result in hazardous substances, pollutants, or contaminants remaining on the Site above levels that allow for unlimited use and unrestricted exposure for more than five years, a statutory review would be required.

Total Capital Cost	$1,772,439
Total Operation and Maintenance	$9,410,460
Total Present Worth Cost	$7,830,000
Estimated Timeframe	30 years

Alternative 3 – Groundwater Extraction and Treatment, Monitored Natural Attenuation, and Institutional Controls

In this alternative, contaminated groundwater from OU3 would be extracted, treated on-site, and then disposed of off-site. Detailed modeling would need to be conducted during the design to determine, for example, where to place the extraction wells, how many to place, and how to treat the contaminated water. However, to arrive at the cost estimates above, it was assumed that five extraction wells screened in the till unit to just above bedrock would be needed. Three would be located in the northern area and two would be placed in the southern area. All wells were assumed to pump at a rate of two gallons per minute.

Separate processes would be needed to treat the water contaminated with 1,4-dioxane differently than the water contaminated with other VOCs only, since 1,4-dioxane is both much more soluble in water and does not adsorb as readily to carbon as the other VOCs present in the groundwater. Disposal of the treated water would be either directly to a surface water body or to a publicly owned treatment facility.

As with Alternative 2, other than for the 1,4-dioxane, which does not naturally biodegrade, MNA would be used to address contamination outside of the extraction zone. The extraction zone would be refined during the remedial design, and institutional controls would be used to assure that the alternative remains protective while the remediation is being completed. Because this remedy would result in hazardous substances, pollutants, or contaminants remaining on the Site above levels that allow for unlimited use and unrestricted exposure for more than five years, a statutory review would be required.

Total Capital Cost	$1,972,573
Total Operation and Maintenance	$15,747,600
Total Present Worth Cost	$11,140,000
Estimated Timeframe	30 years

COMPARATIVE ANALYSIS OF ALTERNATIVES

In selecting a remedy, EPA considers the factors set out in Section 121 of CERCLA, 42 U.S.C. '9261, by conducting a detailed analysis of the viable remedial alternatives pursuant to the NCP, 40 CFR '300.430(e)(9) and Office of Solid Waste and Emergency Response (OSWER) Directive 9355.3-01. The detailed analysis consists of an assessment of the alternatives against each of nine evaluation criteria and comparative analysis focusing upon the relative performance of each alternative against those criteria.

Threshold Criteria - *The first two criteria are known as "threshold criteria" because they are the minimum requirements that each response measure must meet in order to be eligible for selection as a remedy.*

1. **Overall Protection of Human Health and the Environment**

This criterion addresses whether each alternative provides adequate protection of human health and the environment and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled, through treatment, engineering controls, and/or institutional controls.

Alternative 1, no action, would not provide protection of human health and the environment in the long term, since contamination would persist in the groundwater.

Alternative 2, in-situ treatment, and Alternative 3, ex-situ treatment, would eliminate risk through treatment or removal of the contaminated groundwater in the long term, and would be protective in the short term through the placement of institutional controls. Both would comply with the objectives of the remedial action.

2. Compliance with applicable or relevant and appropriate requirements (ARARs)

*Section 121(d) of CERCLA and NCP '300.430(f)(1)(ii)(B) require that remedial actions at CERCLA sites at least attain legally applicable or relevant and appropriate federal and state requirements, standards, criteria and limitations which are collectively referred to as A*ARARs,*@ unless such ARARs are waived under CERCLA Section 121(d)(4).*

<u>Applicable requirements</u> are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, a pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. Only the State standards that are identified by a state in a timely manner and that are more stringent than federal requirements may be applicable. <u>Relevant and appropriate requirements</u> are those clean-up standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that, while not Aapplicable@ to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well-suited to the particular site. Only those state standards that are identified in a timely manner and are more stringent than federal requirements may be relevant and appropriate.

Compliance with ARARs addresses whether a remedy will meet all of the applicable or relevant and appropriate requirements of federal and state environmental statutes or provides a basis for invoking a waiver.

Actions taken at any Superfund site must meet all ARARs of federal and state law, or provide grounds for invoking a waiver of these requirements. These include chemical-specific, location-specific and action-specific ARARs.

ARARs apply to actions taken. As such, they are not applicable to Alternative 1, no action.

Alternatives 2 and 3 will comply with ARARs over time. Both would comply with chemical-specific ARARs through either treatment or removal of contaminated groundwater, though Alternative 2 would likely achieve chemical-specific ARARs faster than Alternative 3. Similarly, both alternatives would meet action-specific ARARs, though due to the need for disposal of treated groundwater, it would be much more difficult for Alternative 3 to meet them.

Primary Balancing Criteria - *The next five criteria, criteria 3 through 7, are known as Aprimary balancing criteria.@ These criteria are factors with which tradeoffs between response measures are assessed so that the best option will be chosen, given the site-specific data and conditions.*

3. **Long-term Effectiveness and Permanence**
Long-term effectiveness and permanence refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup levels have been met. This criterion includes the consideration of residual risk that will remain on site following remediation and the adequacy and reliability of controls.

Alternative 1, No Action, would not be effective in the long term, because contamination would remain the deep and off-property groundwater above applicable standards for the foreseeable future.

Both Alternatives 2 and 3 would provide long-term effectiveness and permanence, since under both alternatives the impacted groundwater would either be treated or removed. Both would require long-term monitoring until ARARs are achieved, though Alternative 3 would likely require a longer active treatment time.

4. Reduction of Toxicity, Mobility or Volume of Contaminants Through Treatment
Reduction of toxicity, mobility, or volume through treatment refers to the anticipated performance of the treatment technologies that may be included as part of a remedy.

Alternative 1 would not reduce the toxicity, mobility or volume of contaminated soil.

Alternative 2 would reduce the toxicity, mobility, and volume of contaminants in the groundwater through treatment. The treatment would degrade contaminants to less-toxic forms, thereby reducing both toxicity and volume, and would reduce mobility through direct source control. Alternative 3 would reduce both the mobility and volume of contaminants in the groundwater, but would not enhance the reduction of toxicity in-situ that is already occurring through natural attenuation processes.

5. Short-term Effectiveness

Short-term effectiveness addresses the period of time needed to implement the remedy and any adverse impacts that may be posed to workers, the community and the environment during construction and operation of the remedy until cleanup levels are achieved.

Alternative 1, no action, would have no short term risks because no action would be taken.

Both Alternatives 2 and 3 would have some impact to the community during pre-design investigations. The impacts to the community posed by Alternative 2 would be low. Periodic access to some properties would be needed to complete injections during the active treatment period and during the long-term monitoring of wells.

Alternative 3 would have a much greater impact on the community due to the need to construct a treatment plant and a groundwater extraction and discharge system. Since a conveyance system to carry the water from the extraction wells to the treatment system would need to be installed, including along roadways and utility corridors, construction of the system would impact both public and private properties. In addition, access to construct such a system would be problematic.

6. Implementability

Implementability addresses the technical and administrative feasibility of a remedy from design through construction and operation. Factors such as availability of services and materials, administrative feasibility, and coordination with other governmental entities are also considered.

Alternative 1, no action, requires no implementation since no action would be taken.

Alternative 2 is readily implementable. The materials needed are generally available and only limited access will be needed to properties near the Site.

Alternative 3 is also implementable, but it would pose a greater challenge to implement than Alternative 2. While the materials needed should be readily available, more invasive access will be needed to properties to install pipelines and extraction wells.

7. Cost

Includes estimated capital and O&M costs, and net present worth value of capital and O&M costs.

Alternative 1 has no associated cost, but is not considered protective of human health and the environment.

The estimated present worth cost of Alternative 2 is $7,830,000. This includes total capital costs of $1,772,439 as well as the Operations and Maintenance (O&M) costs associated with remedy, over a 30-year timeframe.

The estimated present worth cost for Alternative 3 is $11,140,000, which includes total capital costs of $1,972,573 plus O&M costs over an estimated 30-year timeframe. While Alternative 3 has only slightly higher capital costs than Alternative 2, it has significantly higher O&M costs due to the need to pump, treat and dispose of groundwater over the entire length of the remedy.

Modifying Criteria - *The final two evaluation criteria, criteria 8 and 9, are called Amodifying criteria@ because new information or comments from the state or the community on the Proposed Plan may modify the preferred remedy and cause another response measure to be considered.*

8. State/Support Agency Acceptance
Indicates whether based on its review of the RI/FS reports and the Proposed Plan, the state supports, opposes, and/or has identified any reservations with the selected response measure.

NJDEP concurs with the selected remedy, Alternative 2, in-situ treatment of contaminated groundwater, monitored natural attenuation, and institutional controls.

9. Community Acceptance
Summarizes the public=s general response to the proposed alternative and other information described in the Proposed Plan and the RI/FS reports. This assessment includes determining which of the response measures the community supports, opposes, and/or has reservations about.

During the public comment period, the community expressed its support for Alternative 2. No significant concerns were raised during the comment period. The attached Responsiveness Summary summarizes the comments received on the Proposed Plan.

PRINCIPAL THREAT WASTE

EPA defines Principal Threat Waste as "those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained or would present a significant risk to human health or the environment should exposure occur." Principal threat wastes are considered source materials.

This is the third of three operable units for the Site. The first operable unit provided an interim remedy for the Site. The second operable unit addressed remediation of the source material, including the excavation and off-site disposal of a hot spot area of contamination. The source materials addressed as part of the second operable unit constituted the principal threat wastes at the Site. This third and final operable unit will address the contaminated deep groundwater.

SELECTED REMEDY

Based upon consideration of the results of the Site investigation, the requirements of CERCLA, the detailed analysis of the response measures, and public comments, EPA has determined that Alternative 2 is appropriate for addressing the OU3 groundwater contamination. The selected alternative consists of the following components:

- $ Treatment of contaminated off-property and deep groundwater using in-situ treatment technologies, through the injection of a substance or substances into the groundwater to cause or enhance the breakdown of the contaminants of concern to less toxic forms;

- $ Monitored natural attenuation both during and after active treatment; and

- $ Institutional controls to assure that the remedy remains protective until cleanup goals are achieved.

The Selected Remedy was chosen over the other alternatives since it is readily implementable, will reduce the toxicity, mobility, and volume of contamination present in the groundwater, and will be effective in both the short- and long-term. The Selected Remedy greatly reduces the potential of risk to human health and the environment through treatment of the most highly-contaminated area. Bench- and pilot-scale tests conducted at the Site indicate that in-situ treatment approaches will be effective.

Green Remediation

Consistent with EPA Region 2's Clean and Green policy, EPA will evaluate the use of sustainable technologies and practices with respect to the implementation of the Selected Remedy.

STATUTORY DETERMINATIONS

As previously noted, Section 121(b)(1) of CERCLA mandates that a remedial action must be protective of human health and the environment, be cost-effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Section 121(b)(1) also establishes a preference for remedial actions which employ treatment to permanently and significantly reduce the volume, toxicity, or mobility of the hazardous substances, pollutants, or contaminants at the Site. Section 121(d) of CERCLA further specifies that a remedial action must attain a degree of cleanup that satisfies ARARs under federal and state laws, unless a waiver can be justified pursuant to Section 121(d)(4) of CERCLA. As discussed below, EPA has determined that the selected remedy meets the requirements of Section 121 of CERCLA.

Protection of Human Health and the Environment

The Selected Remedy, Alternative 2, will be protective of human health and the environment through the use of in-situ treatment, monitored natural attenuation and institutional controls. In-situ treatment will reduce concentrations of contamination in groundwater over time, including at the source, monitoring both during and after treatment will be used to confirm that natural attenuation processes are occurring, and institutional controls will be use to ensure that no unacceptable exposures to OU3 groundwater occur.

The Selected Remedy will, over time, eliminate all significant risks to human health and the environment associated with potential future Site groundwater use. The action is expected to result in the reduction of the concentration of the chemicals of concern at the Site to below cleanup goals over time. Implementation of the Selected Remedy will not pose unacceptable short-term cancer risks, non-cancer health hazards or adverse cross-media impacts.

Compliance with ARARs

At the completion of the response action, the Selected Remedy will have complied with all applicable ARARs, including, but not limited to:

Chemical-Specific ARARs:

- NJDEP Groundwater Quality Standard for Class II Groundwater, N.J.A.C. 7:9C

Location-Specific ARARs:

- Possibly the Federal National Environmental Policy Act (40 CFR 6, Appendix A)
- Possibly the New Jersey Flood Hazard Control Act (N.J.A.C. 7:13)

Action-Specific ARARS:

- Safe Drinking Water Act Underground Injection Control Program
- Well Drilling and Pump Installers Licensing Act
- Discharge to Groundwater Regulations
- Possibly New Jersey Pollutant Discharge Elimination System Rules (N.J.A.C. 7:14A)
- Occupational Safety and Health Act (OSHA, 29 USC 651-678)
- Possibly New Jersey Soil Erosion and Sediment Control Act (N.J.S.A. 4:24-39 et seq.)
- Institutional controls would be implemented in accordance with N.J.A.C. 7.26C (Subchapter 7)

Cost-Effectiveness

EPA has determined that the Selected Remedy is cost-effective and represents a reasonable value. In making this determination, the following definition was used: “A remedy shall be cost-effective if its costs are proportional to its overall effectiveness” (NCP §300.430(f)(1)(ii)(D)). EPA evaluated the “overall effectiveness” of those alternatives that satisfied the threshold criteria (i.e., were both protective of human health and the environment and ARAR-compliant). Overall effectiveness was evaluated by assessing three of the five balancing criteria in combination (long-term effectiveness and permanence; reduction in toxicity, mobility and volume through treatment; and short-term effectiveness). Overall effectiveness was then compared to costs to determine cost-effectiveness. The relationship of the overall effectiveness of the Selected Remedy was determined to be proportional to its costs and hence this alternative represents a reasonable value.

The Selected Remedy is cost-effective as it has been determined to provide the greatest overall protectiveness for its present worth costs.

Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

EPA has determined that the Selected Remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner at the Site. Of those alternatives that are protective of human health and the environment and comply with ARARs, EPA has determined that the Selected Remedy provides the best balance of trade-offs in terms of the five balancing criteria, while also considering the statutory preference for treatment as a principal element and considering State and community acceptance.

The Selected Remedy satisfies the criteria for long-term effectiveness and permanence by preventing exposure to the contaminated groundwater until cleanup goals are met and treating the contaminants in-situ. The Selected Remedy presents less short-term risks the other active alternative as the treatment technique would have less impact on the community.

Preference for Treatment as a Principal Element

By utilizing treatment of the groundwater contamination source area, the Selected Remedy satisfies the statutory preference for remedies that employ treatment as a principal element.

Five-Year Review Requirements

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on the Site above levels that allow for unlimited use and unrestricted exposure for more than five years, a statutory review is indicated. In addition, the OU2 remedy resulted in hazardous substances, pollutants or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure. As such, statutory five-year reviews are already being conducted to ensure the remedies for the Site are protective of human health and the environment. The next review is scheduled for completion in December 2012.

DOCUMENTATION OF SIGNIFICANT CHANGES

The Proposed Plan for the SCP Site was released for public comment on August 3, 2012 and the public comment period ran from that date through September 4, 2012.

All written and verbal comments submitted during the public comment period were reviewed by EPA. Upon review of these comments, EPA has determined that no significant changes to the remedy, as it was originally identified in the Proposed Plan, were necessary.

APPENDIX I

FIGURES

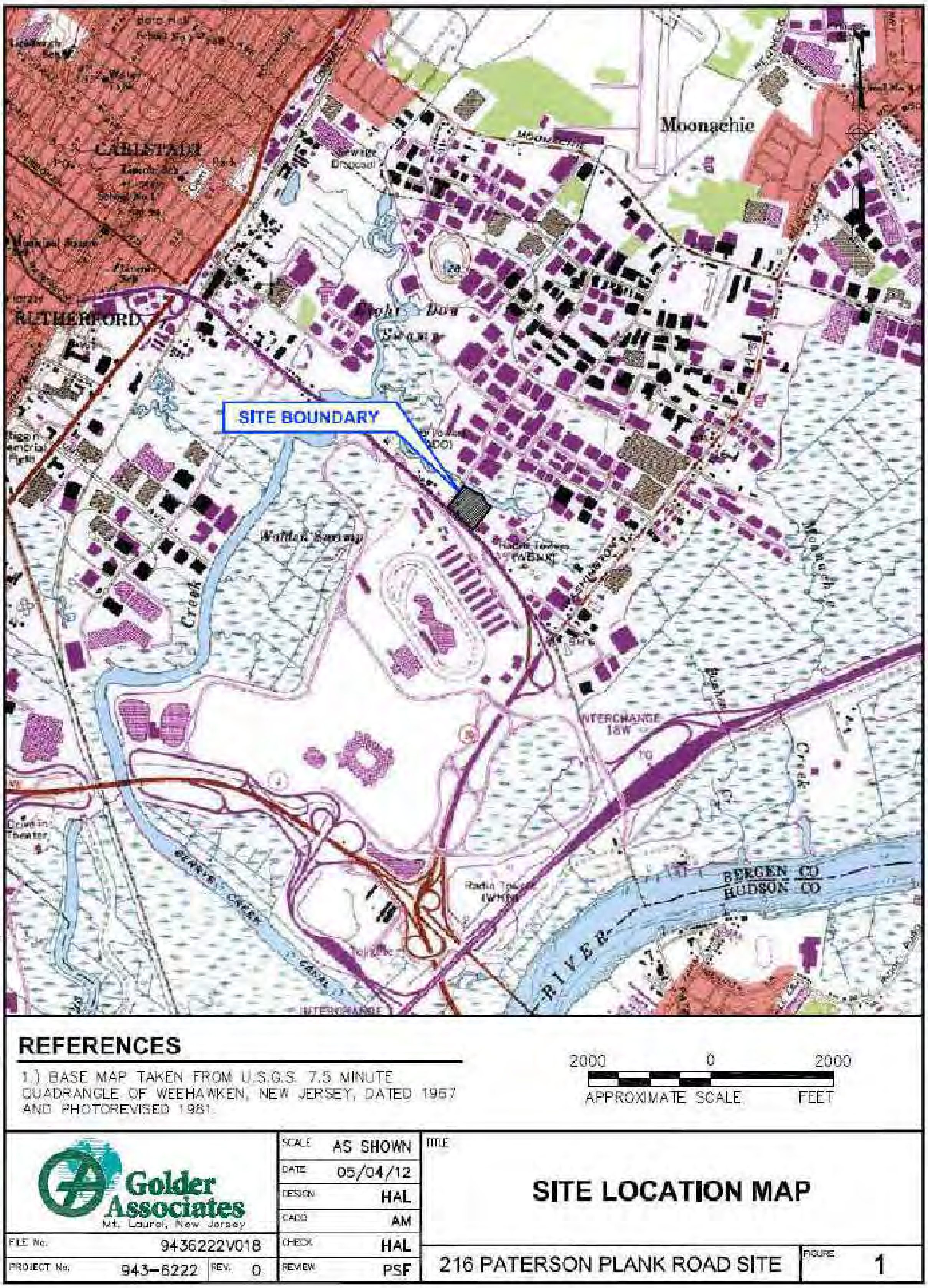


Figure 1
Scientific Chemical Processing Site, OU – Site Location Map

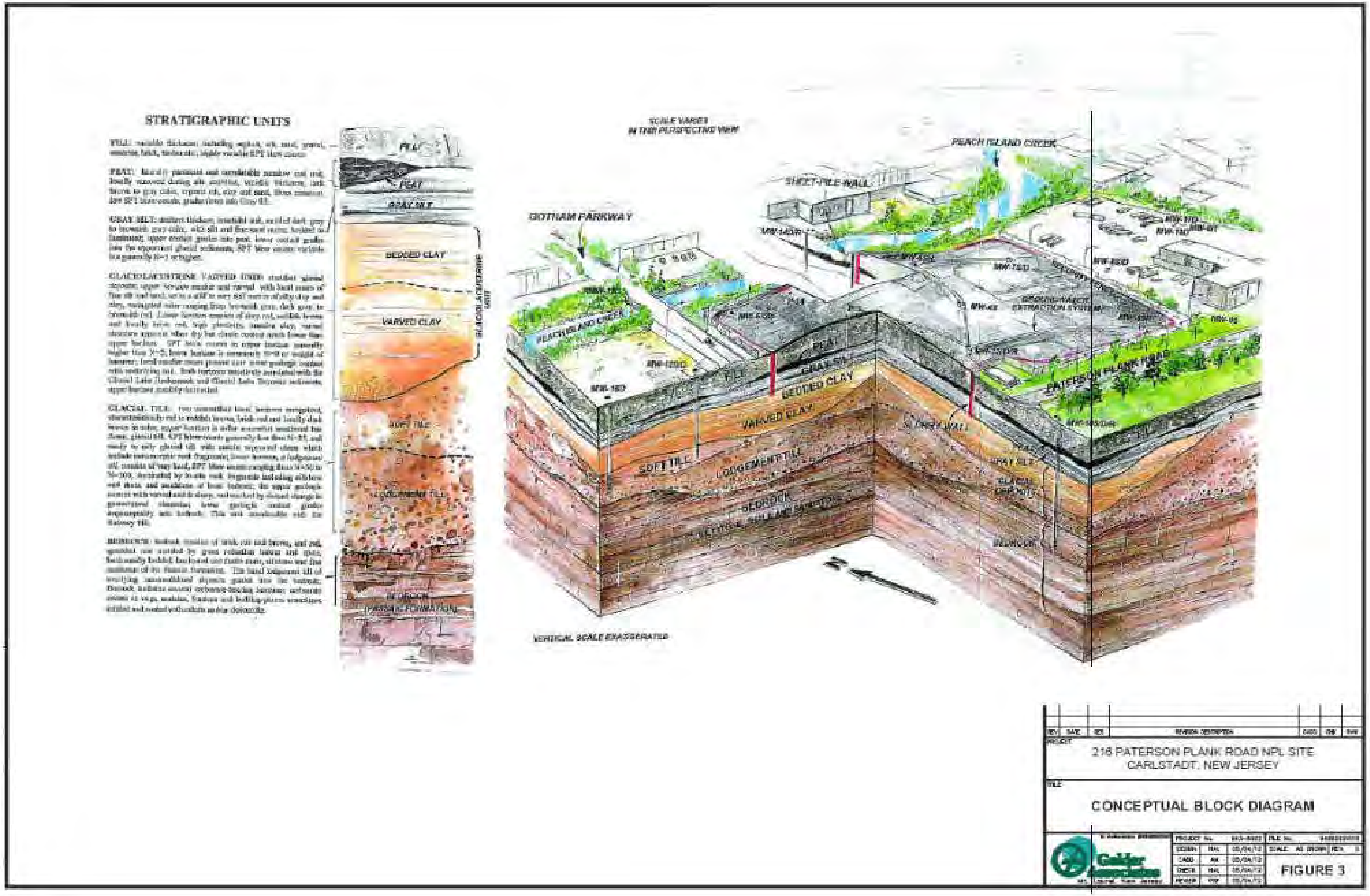


Figure 2
Scientific Chemical Processing Site, OU – Site Geology

Figure 3
Scientific Chemical Processing Site, OU – Site Layout

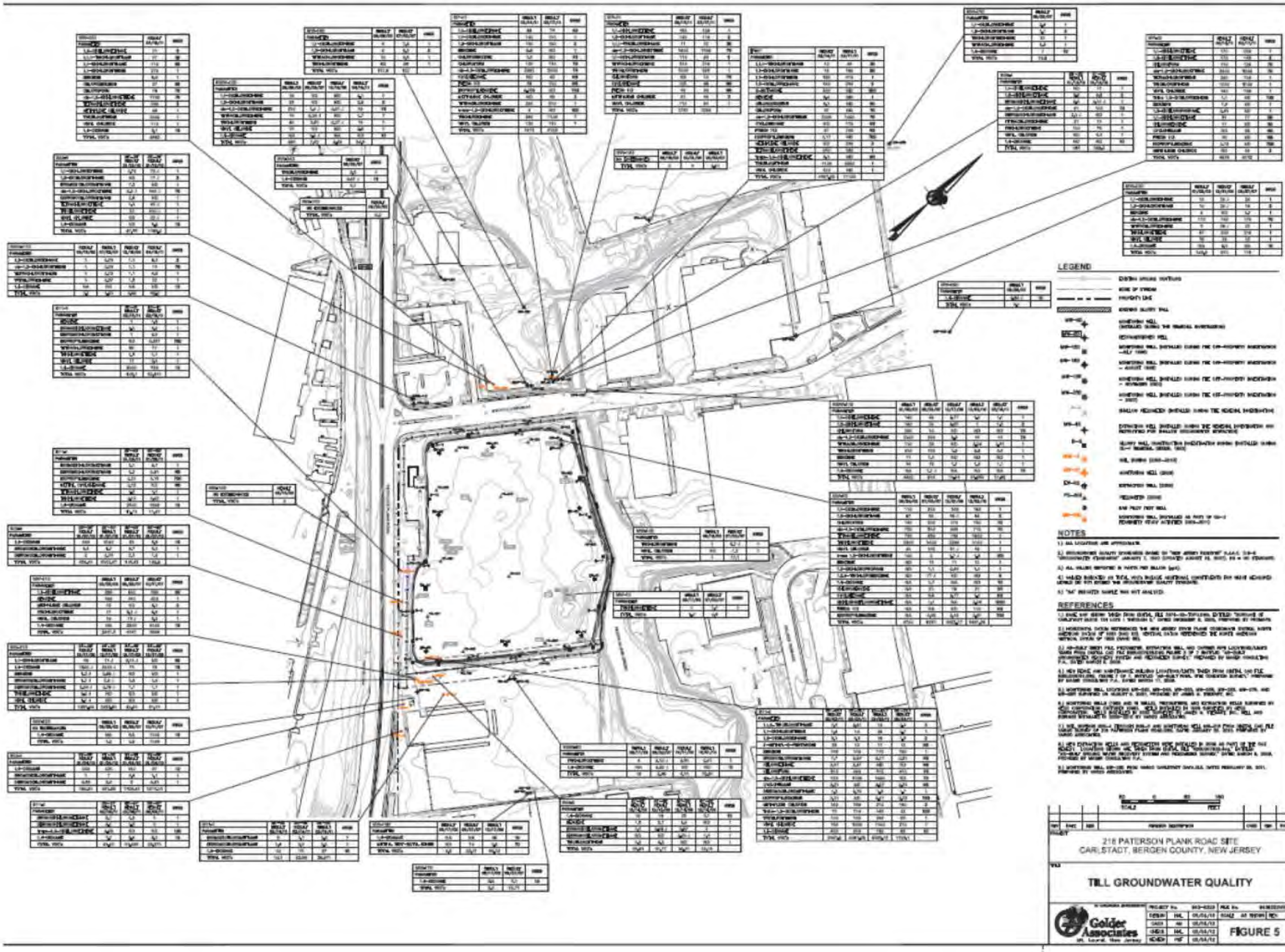
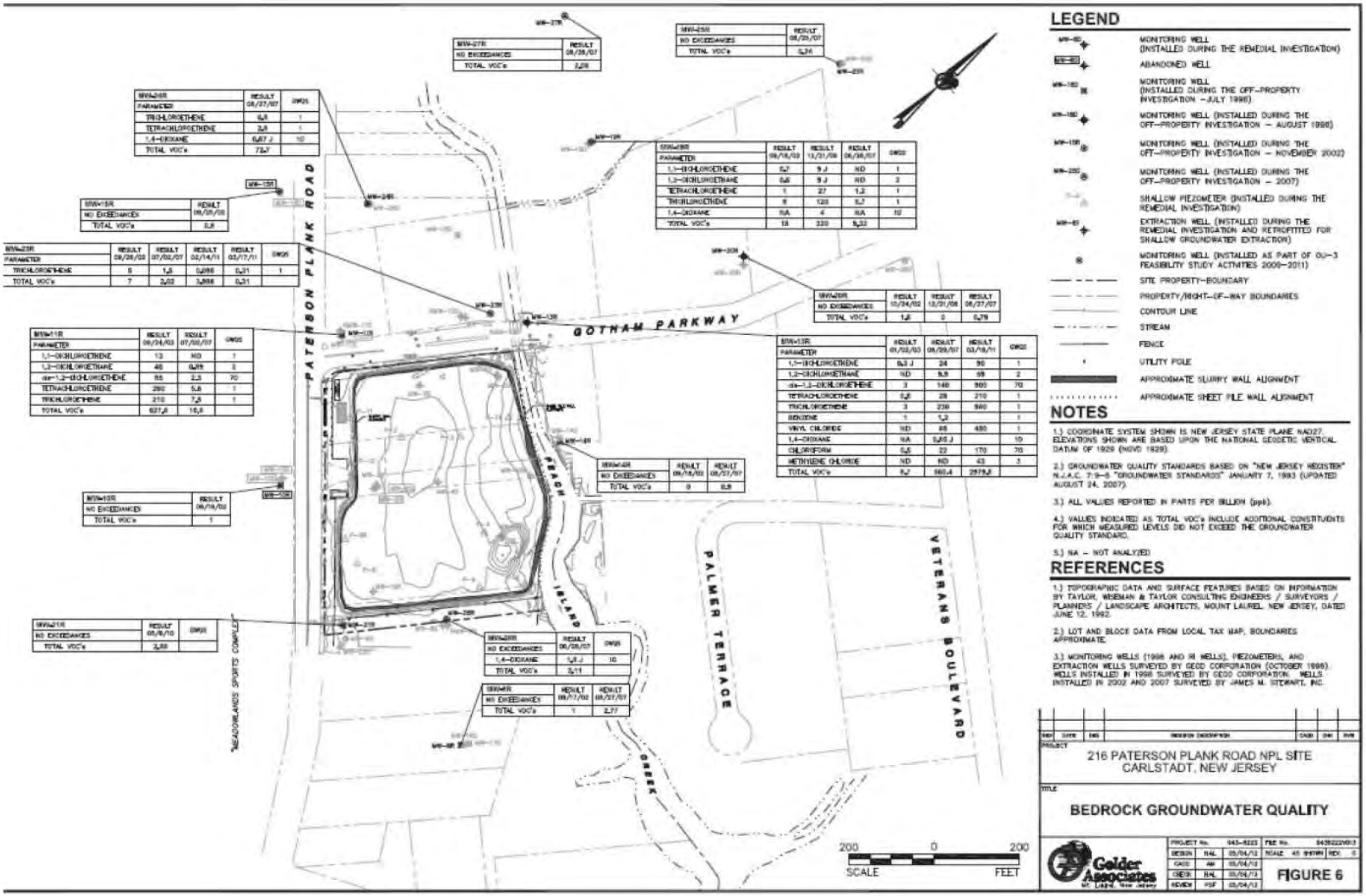


Figure 4
Scientific Chemical Processing Site, OU – Till Groundwater Quality

Figure 5
Scientific Chemical Processing Site, OU – Bedrock Groundwater Quality



R2-0002838

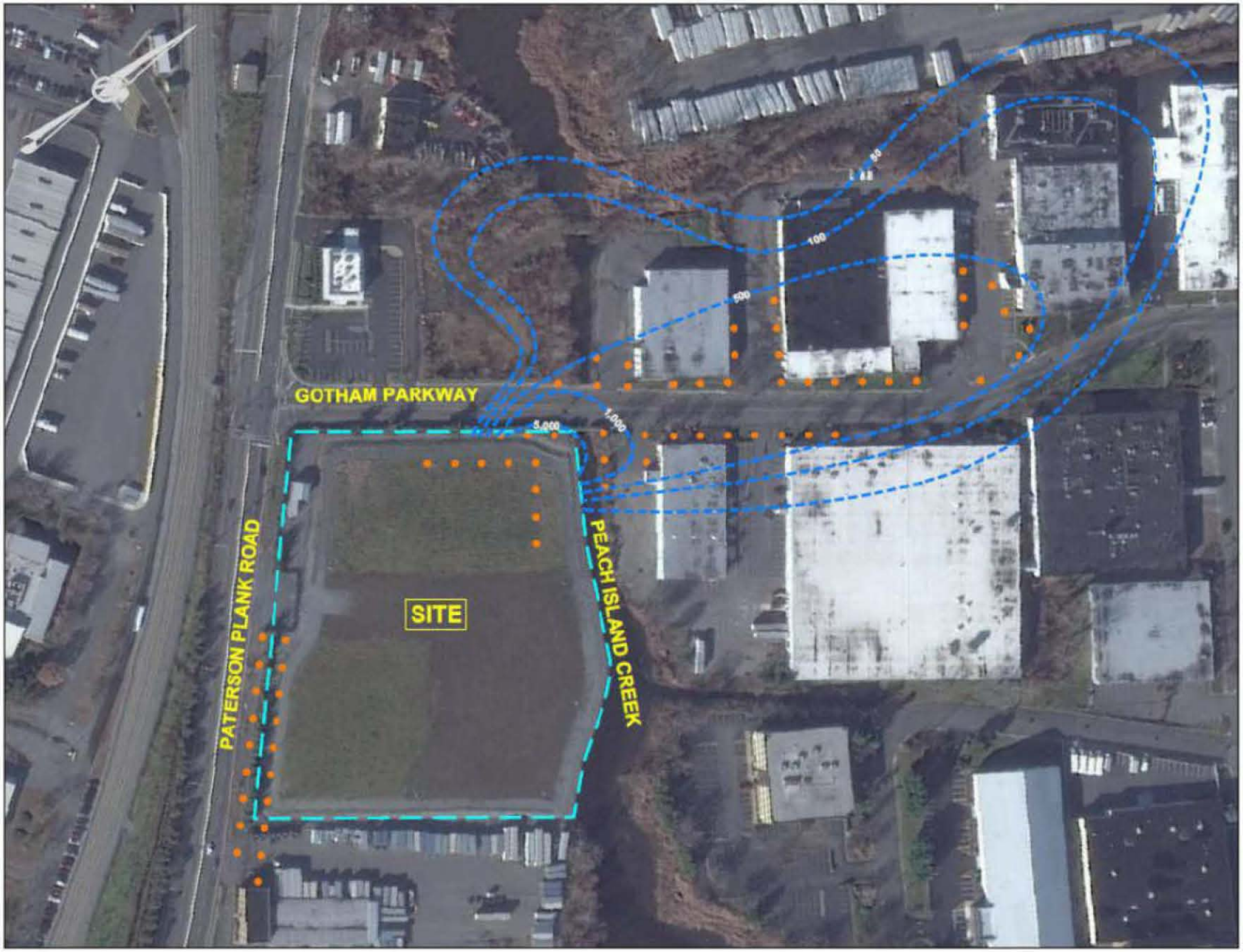


Figure 6
Scientific Chemical Processing Site, OU – Selected Remedy

APPENDIX II

TABLES

Table 1
Conceptual Site Model
Scientific Chemical Processing Site, OU-3 - Carlstadt, New Jersey

Scenario Timeframe	Medium	Exposure Medium	Receptor Population	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current	Bedrock / Till Groundwater	Groundwater	Trespasser	Adolescent	Adolescent 12 to 18 years of age	Ingestion Dermal	None	Currently there are no water supply wells in bedrock/till groundwater and access to deep groundwater is incomplete for all receptors. The Site is currently active for industrial/commercial purposes and is fenced with limited access for trespassers.
Future	Bedrock / Till Groundwater	Tap Water	Tap Water	Resident	Adult	Ingestion Dermal	Quantitative	Potential for future use of bedrock/till groundwater for residential consumption.
					Child	Ingestion Dermal	Quantitative	
	Bedrock / Till Groundwater	Tap Water	Water Vapor at Showerhead	Resident	Adult	Ingestion Dermal	Quantitative	Potential for future use of bedrock/till groundwater for residential consumption and indoor use such as showering.
					Child	Ingestion Dermal	Quantitative	
	Bedrock / Till Groundwater	Soil Vapor	Indoor Air	Resident	Adult	Inhalation	Quantitative	Vapor intrusion unlikely since deep bedrock groundwater is separated from surface by confining unit and shallow aquifer.
					Child	Inhalation	Quantitative	
	Bedrock / Till Groundwater	Tap Water	Tap Water	Industrial/ Commercial Worker	Adult	Ingestion Dermal	Quantitative	Potential for future use of bedrock/till groundwater for consumption by workers. Showering was not evaluated quantitatively since risks were below the risk range for residential exposures and evaluation of the worker exposures would be also be below the risk range.
							Quantitative	
	Bedrock / Till Groundwater	Soil Vapor	Indoor Air	Industrial/ Commercial Worker	Adult	Inhalation	Qualitative	Vapor intrusion unlikely since deep bedrock groundwater is separated from surface by confining unit and shallow aquifer.
							Qualitative	

Table 2
Exposure Point Concentrations for Chemicals of Concern
Scientific Chemical Processing Site, OU-3 - Carlstadt, NJ

Scenario Timeframe:	Future
Medium:	Groundwater
Exposure Medium:	Tap Water

Exposure Point	Chemicals of Potential Concern	Concentrations Detected		Units (2)	Frequency of Detection	Exposure Point Concentration - RME and CTE			
		Minimum (1)	Maximum			Value	Units	Statistic (3)	Rationale
Tap Water	1,1-Dichloroethane	0.1 (J)	600	ug/L	45/73	91	ug/l	97.5% KM (Chebyshev) UCL	ProUCL
	1,2,4-trichlorobenzene	0.19 (J)	77 (J)	ug/L	2/70	11	ug/l	97.5% KM (Chebyshev) UCL	ProUCL
	1,2-dichloroethane	0.46 (J)	120	ug/L	22/71	11	ug/l	05% (KM) (t) UCL	ProUCL
	cis-1,2-dichloroethene	0.1 (J)	910	ug/L	51/71	235	ug/l	97.5% KM (Chebyshev) UCL	ProUCL
	1,4-Dioxane	0.47 (J)	4,300	ug/L	36/46	1,958	ug/l	99% KM (Chebyshev) UCL	ProUCL
	benzene	0.1 (J)	420	ug/L	23/72	60	ug/l	97.5% KM (Chebyshev) UCL	ProUCL
	chloroform	0.45 (J)	200 (J)	ug/L	34/72	18	ug/l	95% KM (BCA) UCL	ProUCL
	Tetrachloroethylene	0.1 (J)	1,000	ug/L	33/71	215	ug/l	97.5% KM (Chebyshev) UCL	ProUCL
	Trichloroethylene	0.12 (J)	3,600	ug/L	51/72	735	ug/l	97.5% KM (Chebyshev) UCL	ProUCL
	vinyl chloride	0.21 (J)	150 (J)	ug/L	19/72	12	ug/l	95% KM (t) UCL	ProUCL

(1) The Qualifier code (J) indicates that the analyte was detected and is considered an estimated value. Data was obtained from RAGS Part D - Table 3 in the Baseline Human Health Risk Assessment.
(2) Units of detection were micrograms/liter (or ug/l) which are equivalent to parts per billion (ppb).
(3) The statistical methods provided were based on recommendations from ProUCL version 4.1 available at: http://www.epa.gov/esd/tsc/software.htm. The calculations were obtained from RAGS Part D Table 3.1 and ProUCL Statistical Outputs provided in the Baseline Human Health Risk Assessment.

Table 3A
Non-Cancer Toxicity Data - Oral/Dermal
Scientific Chemical Processing Site, OU-3 - Carlstadt, New Jersey

Chemicals of Concern	Chronic/ Subchronic	Oral RfD		Dermal (1)		Absorbed RfD for Dermal		Primary Target Organ	Combined Uncertainty/ Modifying	RfD Target (organs)	
		Value	Units	Value	Reference	Value (2)	Units			Sources (3)	Date (MM/DD/YYYY)
1,1-dichloroethane	Chronic	0.2	mg/kg-day	1	EPA (2004)	0.2	mg/kg-day	kidney	3000/1	PPRTV	9/27/2006
1,2,4-trichlorobenzene	Chronic	0.01	mg/kg-day	1	EPA (2004)	0.01	mg/kg-day	kidney	1000/1	IRIS	11/1/1996
1,2-dichloroethane	Chronic	0.02	mg/kg-day	1	EPA (2004)	0.02	mg/kg-day	neurological effects	3000/1	PPRTV	10/1/2010
cis-1,2-dichloroethene	Chronic	0.002	mg/kg-day	1	EPA (2004)	0.002	mg/kg-day	Kidney	3000/1	IRIS	9/30/2010
1,4-Dioxane	Chronic	0.03	mg/kg-day	1	EPA (2004)	0.03	mg/kg-day	Liver, Kidney	300/1	IRIS	8/11/2010
benzene	Chronic	0.004	mg/kg-day	1	EPA (2004)	0.004	mg/kg-day	blood	300	IRIS	4/17/2003
chloroform	Chronic	0.01	mg/kg-day	1	EPA (2004)	0.01	mg/kg-day	liver	1000/1	IRIS	10/19/2001
Tetrachloroethylene	Chronic	0.01	mg/kg-day	1	EPA (2004)	0.01	mg/kg-day	Neurological effects	1000/1	IRIS	2/10/2012
Trichloroethylene	Chronic	0.001	mg/kg-day	1	EPA (2004)	0.001	mg/kg-day	Heart, thymus, blood	10/1	IRIS	9/28/2011
vinyl chloride	Chronic	0.003	mg/kg-day	1	EPA (2004)	0.003	mg/kg-day	Liver	30/1	IRIS	8/7/2000

(1) The oral absorption efficiency data was obtained from the Risk Assessment Guidance for Superufnd, Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment). Final
(2) Dermal Reference Dose (RfD) values were calculated by multiplying the oral RfD by the Oral Absorption Efficiency for Dermal.
(3) IRIS is the Integrated Risk Information System available at www.epa.gov/iris.
mg/kg-day is milligrams/kilogram bodyweight - day
EPA (2004). Risk Assessment Guidance for Superufnd (RAGS). Volume I. Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assesment). Final. EPA/540/R/99/005. July 2004.

Table 3B
Non-Cancer Toxicity Data - Inhalation
Scientific Chemical Processing Site, OU-3 - Carlstadt, New Jersey

Chemicals of Concern	Chronic/ Subchronic	Inhalation RfC		Primary Target Organ	Combined Uncertainty/ Modifying Factors	RfC Target Organs	
		Value	Units			Sources (1)	Date (MM/DD/ YYYY)
1.1-dichloroethane	Chronic	--	ug/m3	--			
1,2,4-trichloroebenzene	Chronic	2	ug/m3	urinary porphyrin excretion	3000/1	PPRTV	6/16/2009
1,2-dichloroethane	Chronic	2400	ug/m3	NOAEL	90	ATSDR	Sep-01
cis-1,2-dichloroethene	Chronic	--	ug/m3	--	--	IRIS	9/30/2010
1,4-Dioxane *	Chronic	3.6E+03	ug/m3	No Observed Adverse Effects Level	30	ATSDR	8/1/2007
Benzene	Chronic	3.0E+01	ug/m3	blood	30	IRIS	4/17/2003
Chloroform	Chronic	9.8E+01	ug/m3	decreased blood cell count	10	ATSDR	8/1/2007
Tetrachloroethylene	Chronic	4.0E+01	ug/m3	Neurological	1000/1	IRIS	2/10/2012
Trichloroethylene	Chronic	2.0E+00	ug/m3	Thymus, heart	10/1	IRIS	9/28/2011
Vinyl chloride	Chronic	1.0E+02	ug/m3	liver	30/1	IRIS	8/7/2000

* An updated toxicity value for chronic exposure to 1,4-dioxane was issued by ATSDR in April of 2012. The comparison of the intake/Exposure Concentration provided in Table 7.1 to this updated toxicity values indicates tht the non-cancer HI remains below the level of concern of an HQ = 1. The resulting HI changes from 3.7E-08 to 1.2E-06.

-- Indicates that a toxicity value is not available based on the Toxicity Hierarchy available in the OSWER Toxicity Hierarchy memo dated 12/5/2003 (OSWER Directive 9285.7-53).

(1) References for inhlation RfC are: ATSDR - Agency for Toxic Substances and Disease Registry and IRIS is the Integrated Risk Information System.

Table 4A
Cancer Toxicity Data - Oral/Dermal
Scientific Chemical Processing Site, OU-3 - Carlstadt, New Jersey

Chemicals of Concern	Oral Cancer Slope Factor		Dermal Cancer Slope		Weight of Evidence Cancer Guidelines Description	Sources	Date (MM/DD/YYYY)
	Value	Units	Value	Units			
1,1-dichloroethane	5.70E-03	(mg/kg-day)-1	5.70E-03	(mg/kg-day)-1	C	IRIS	2/1/1994
1,2,4-trichlorobenzene	2.90E-02	(mg/kg-day)-1	2.90E-02	(mg/kg-day)-1	Likely to be carcinogenic in humans	PPRTV	6/16/2009
1,2-dichloroethane	9.10E-02	(mg/kg-day)-1	9.10E-02	(mg/kg-day)-1	B2	IRIS	1/1/1991
cis-1,2-dichloroethene	--	(mg/kg-day)-1	--	mg/kg-day	D - not classifiable	IRIS	2/1/1995
1,4-Dioxane	1.0E-02	(mg/kg-day)-1	1.0E-02	mg/kg-day	Likely to be carcinogenic in humans	IRIS	8/11/2010
Benzene	5.50E-02	(mg/kg-day)-1	5.50E-02	(mg/kg-day)-1	A	IRIS	1/19/2000
chloroform	3.10E-02	(mg/kg-day)-1	3.10E-02	(mg/kg-day)-1	B2	CalEPA	10/19/2001
Tetrachloroethylene	2.1E-03	(mg/kg-day)-1	2.1E-03	mg/kg-day	Known human carcinogen.	IRIS	2/10/2012
Trichloroethylene	4.6E-02	(mg/kg-day)-1	4.6E-02	mg/kg-day	Likely to be carcinogenic in humans	IRIS	9/28/2011
vinyl chloride	7.2E-01	(mg/kg-day)-1	7.2E-01	(mg/kg-day)-1	A	IRIS	8/7/2000

-- Indicates that a toxicity value is not available based on the Toxicity Hierarchy available in the OSWER Toxicity Hierarchy memo dated 12/5/2003 (OSWER Directive

mg/kg-day is milligrams/kilogram bodyweight/day.

(1) IRIS is the Integrated Risk Information System available at www.epa.gov/iris.

Table 4B
Cancer Toxicity Data - Inhalation
Scientific Chemical Processing Site, OU-3 - Carlstadt, New Jersey

Chemicals of Concern	Unit Risk		Inhalation Cancer Slope Factor		Weight of Evidence Cancer Guidelines Description	Inhalation Unit Risk	
	Value	Units	Value	Units		Sources (3)	Date (MM/DD/YYYY)
1,1-dichloroethane	1.60E-06	$(ug/m^3)^{-1}$			C	CalEPA	12/1/1996
1,2,4-trichlorobenzene					D - not classifiable	IRIS	3/1/1991
1,2-dichloroethane	2.60E-05	$(ug/m^3)^{-1}$			B2	IRIS	1/1/1991
cis-1,2-dichloroethene	--	$(ug/m^3)^{-1}$	--	--	D - not classifiable	IRIS	2/1/1995
1,4-Dioxane	--	--	--	--	Likely to be carcinogenic in humans	IRIS	9/30/2010
1,4-Dioxane	7.7E-06	$(ug/m^3)^{-1}$				CalEPA	2/1/2009
benzene	7.8E-06	$(ug/m^3)^{-1}$			A - known human carcinogen	IRIS	1/19/2000
chloroform	2.30E-05	$(ug/m^3)^{-1}$			B2	IRIS	10/19/2001
Tetrachloroethylene	2.6E-07	$(ug/m^3)^{-1}$	--	--	Known human carcinogen.	IRIS	2/10/2012
Trichloroethylene	4.1E-06	$(ug/m^3)^{-1}$	--	--	Likely to be carcinogenic in humans	IRIS	9/28/2011
vinyl chloride	4.4E-06	$(ug/m^3)^{-1}$			A - known human carcinogen	IRIS	8/7/2000

- indicates inhalation cancer slope factor was not used.
ug/m3 is micrograms/cubic meter
IRIS is the Integrated Risk Information System available at www.epa.gov/iris

R2-0002846

Table 5A
Risk Characterization Summary
Scientific Chemical Processing Site, OU-3 - Carlstadt, NJ.

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Reasonable Maximum Exposure

Medium	Exposure Medium	Exposure Point	Chemicals of Concern	Carcinogenic Risk: Ingestion	Carcinogenic Risk: Inhalation	Carcinogenic Risk: Dermal	Carcinogenic Risk: Exposue Routes Total	Non-Cancer Hazard Quotient: Primary Target Organs (Oral and Dermal/ Inhalation)	Non-Cancer Hazard Quotient: Ingestion	Non-Cancer Hazard Quotient: Inhalation	Non-Cancer Hazard Quotient: Dermal	Non-Cancer Hazard Quotient: Exposure Routes Total
Bedrock/Till Groundwater	Tap Water	Tap Water	1,1-dichloroethane	6.00E-06	2.00E-11	3.00E-07	6.3E-06	Kidney / --	--	--	0.0006	0.0006
			1,2,4-trichlorobenzene	4.00E-06	--	3.00E-06	7.0E-06	kidney / urinary tract	0.03	2.00E-06	0.03	0.06
			1,2-dichloroethane	6.00E-06	5.00E-11	2.00E-07	6.2E-06	neurological / NOAEL	0.02	2.00E-09	0.0005	0.02
			cis-1,2-dichloroethene	--	--	--	0.0E+00	Kidney / --	3.2	--	0.2	3.4
			1,4-Dioxane	2.3E-03	4.3E-10	5.4E-06	2.3E-03	Liver and Kidney / NOAEL	1.8	4E-08	0.004	1.8
			Benzene	4.00E-05	8.00E-11	4.00E-06	4.4E-05	blood / blood	0.4	8.00E-07	0.04	0.44
			Chloroform	7.00E-06	8.00E-11	4.00E-07	7.4E-06	liver / decreased blood cell	0.05	8.00E-08	0.003	0.05
			Tetrachloroethylene	5.3E-06	9.1E-12	2.1E-06	7.4E-06	Neurological effects/	0.98	2E-06	0.4	1.4
			Trichloroethylene	4.0E-04	5.1E-10	4.5E-05	4.5E-04	Heart, Thymus, Blood /	40	1E-04	4.6	44.6
			Vinyl chloride	1.0E-04	1.0E-11	3.0E-06	1.0E-04	liver / liver	0.1	5E-08	0.004	0.1
			Chemical Total	3E-03	1E-09	6E-05	3E-03		47	0.0001	5	52
Groundwater Risk Total							3E-03					52
Total Risk							3E-03					52

HI - Liver and Kidney	1.8
HI- Kidney	3.4
HI - Neurological Effects	1.4
HI - Heart, thymus, blood	44.6

Central Tendency Exposure

Medium	Exposure Medium	Exposure Point	Chemicals of Concern	Carcinogenic Risk: Ingestion	Carcinogenic Risk: Inhalation	Carcinogenic Risk: Dermal	Carcinogenic Risk: Exposue Routes Total	Non-Cancer Hazard Quotient: Primary Target Organs (Oral and Dermal/ Inhalation)	Non-Cancer Hazard Quotient: Ingestion	Non-Cancer Hazard Quotient: Inhalation	Non-Cancer Hazard Quotient: Dermal	Non-Cancer Hazard Quotient: Exposure Routes Total
Bedrock/Till Groundwater	Tap Water	Tap Water	1,1-dichloroethane	9.00E-07	5.00E-13	6.00E-08		Kidney / --	--		0.0004	0.0004
			1,2,4-trichlorobenzene	6.00E-07		6.00E-07	1E-06	Kidney / urinary tract	0.01	0.0000001	0.02	0.03
			1,2-dichloroethane	2.00E-06	1.00E-12	7.00E-08	2E-06	Neurological effects / NOAEL	0.01	0.0000000001	0.0003	0.008
			cis 1,2-dichloroethylene	--	--	--		Kidney / --	2.00	--	0.1	2.1
			1,4-Dioxane	3.4E-04	9.4E-12	1.0E-06	3E-04	Liver and Kidney / NOAEL	0.89	0.000000003	0.003	0.89
			benzene	6.0E-06	2.0E-12	7.0E-07	7E-06	blood / blood	0.20	0.00000006	0.03	0.23
			chloroform	1.0E-06	2.0E-12	8.0E-08	1E-06	liver / decreased blood cell count	0.03	0.000000006	0.002	0.032
			Tetrachloroethylene	8.0E-07	2.0E-13	3.9E-07	1E-06	Neurological effects / neurological	0.49	0.0000002	0.2	0.73
			Trichloroethylene	6.0E-05	1.1E-11	8.6E-06	7E-05	Heart, Thymus, Blood / thymus and heart	20.00	0.00001	2.9	22.9
			vinyl chloride	1.0E-05	2.0E-13	6.0E-07	1E-05	liver / liver	0.05	0.000000004	0.002	0.05
			Chemical Total	4E-04	3E-11	1E-05	4E-04		24	0.00001	3	27
Groundwater Risk Total							4E-04					27
Total Risk							4E-04					27

HI - Liver and Kidney	0.9
HI- Kidney	2.1
HI - Neurological Effects	0.7
HI - Heart, thymus, blood	22.9

-- indicates chemical not evaluated for carcinogenicity based on a lack of toxicity values.

R2-0002847

Table 5B
Risk Characterization Summary
Scientific Chemical Processing Site, OU-3 - Carlstadt, NJ.

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Reasonable Maximum Exposure

Medium	Exposure Medium	Exposure Point	Chemicals of Concern	Carcinogenic Risk				Non-Cancer Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposue Routes Total	Primary Target Organs (Oral and Dermal/ Inhalation)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Bedrock/Till Groundwater	Tap Water	Tap Water	1,1-dichloroethane	2.80E-06	1.60E-11	1.40E-07	2.94E-06	Kidney / --	--	--	0.0015	0.0015
			1,2,4-trichlorobenzene	1.70E-06	--	1.50E-06	3.20E-06	kidney / urinary tract	7.00E-02	0.000006	0.06	0.1
			1,2-dichloroethane	5.60E-06	3.20E-11	1.80E-07	5.78E-06	neurological / NOAEL	0.04	0.000000006	0.0011	0.04
			cis-1,2-dichloroethene	--	--	--		Kidney / --	7.5	--	0.4	7.9
			1,4-Dioxane	1.1E-03	2.7E-10	2.5E-06	1.10E-03	Liver and Kidney /	4.2	0.0000001	0.0097	4.2
			benzene	1.80E-05	4.80E-11	1.80E-06	1.98E-05	blood / blood	0.95	0.000002	0.09	1.0
			chloroform	3.10E-06	4.60E-11	1.80E-07	3.28E-06	liver / decreased blood	0.12	0.0000002	0.007	0.1
			Tetrachloroethylene	2.5E-06	5.6E-12	1.0E-06	3.50E-06	Neurological effects/	2.30	0.000006	0.9	3.2
			Trichloroethylene	9.9E-04	1.7E-09	1.1E-04	1.10E-03	Heart, Thymus, Blood /	94	0.0004	11.0	105
			vinyl chloride	9.1E-05	1.2E-11	3.1E-06	9.41E-05	liver / liver	0.25	0.0000002	0.01	0.3
			Chemical Total	2E-03	2E-09	1E-04	2E-03		109	0.0004	12	122
		Groundwater Risk Total					2E-03					122
Total Risk							2E-03					122

HI - Liver and Kidney	4.2
HI- Kidney	7.9
HI - Neurological Effects	3.2
HI - Heart, thymus, blood	105

Central Tendency Exposure

Medium	Exposure Medium	Exposure Point	Chemicals of Concern	Carcinogenic Risk				Non-Cancer Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposue Routes Total	Primary Target Organs (Oral and Dermal/ Inhalation)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Bedrock/Till Groundwater	Tap Water	Tap Water	1,1-dichloroethane	1.00E-06	5.00E-13	8.00E-08	1.08E-06	Kidney / --	--	--	0.0008	0.0008
			1,2,4-trichlorobenzene	9.00E-07	--	8.00E-07	1.70E-06	kidney / urinary tract	0.03	0.0000002	0.03	0.0600002
			1,2-dichloroethane	3.00E-06	1.00E-12	1.00E-07	3.10E-06	neurological / NOAEL	0.02	0.0000000002	0.0006	0.02
			cis-1,2-dichloroethene	--	--	--	--	Kidney / --	3.8	--	0.2	4.0
			1,4-Dioxane	5.4E-04	8.0E-12	1.4E-06	5.41E-04	Liver and Kidney /	2.1	0.000000003	0.005	2.1
			benzene	9.0E-06	1.0E-12	1.0E-06	1.00E-05	blood / blood	0.5	--	0.05	0.6
			chloroform	2.00E-06	1.00E-12	1.00E-07	2.10E-06	liver / decreased blood	0.06	0.000000007	0.004	0.06
			Tetrachloroethylene	1.2E-06	2.0E-13	5.3E-07	1.73E-06	Neurological effects/	1.1	0.0000002	0.5	1.6
			Trichloroethylene	4.9E-04	5.0E-11	6.2E-05	5.52E-04	Heart, Thymus, Blood /	47	0.00001	5.9	52.9
			vinyl chloride	5.0E-05	4.0E-13	2.0E-06	5.20E-05	liver / liver	0.1	0.000000005	0.005	0.1
			Chemical Total	1.1E-03	6.2E-11	6.8E-05	1E-03		54.7	0.00001	6.7	61
		Groundwater Risk Total					1E-03					61
Total Risk							1E-03					61

-- indicates chemical not evaluated for carcinogenicity based on a lack of toxicity values.

HI - Liver and Kidney	2.1
HI- Kidney	4
HI - Neurological Effects	1.6
HI - Heart, thymus, blood	52.9

R2-0002848

Table 5C
Risk Characterization Summary
Scientific Chemical Processing Site, OU-3 - Carlstadt, NJ.

Scenario Timeframe: Future
Receptor Population: Industrial/Commercial Worker
Receptor Age: Adult

Reasonable Maximum Exposure Assumptions

Medium	Exposure Medium	Exposure Point	Chemicals of Concern	Carcinogenic Risk				Non-Cancer Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposue Routes Total	Primary Target Organs (Oral and Dermal/ Inhalation)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Bedrock/Till Groundwater	Tap Water	Tap Water	1,1 dichloroethane	1.80E-06	--	4.50E-09	1.80E-06	blood	--	--	0.0001	0.0001
			1,2,4-trichlorobenzene	1.10E-06	--	4.30E-07	1.53E-06	kidney	0.01	--	0.004	0.01
			1,2-dichloroethane	3.60E-06	--	5.10E-08	3.65E-06	neurological effects	0.006	--	0.00008	0.006
			cis-1,2-dichloroethene	--	--	--		Kidney	1.1	--	0.03	1.1
			1,4-Dioxane	6.8E-04	--	7.2E-07	6.81E-04	Liver and Kidney	0.6	--	0.0007	0.6
			benzene	1.1E-05	--	5.1E-07	1.15E-05	blood	0.1	--	0.01	0.1
			chloroform	2.00E-06	--	5.00E-08	2.05E-06	liver	0.02	--	0.001	0.02
			Tetrachloroethylene	1.6E-06	--	3.0E-07	1.90E-06	Neurological effects	0.35	--	0.1	0.4
			Trichloroethylene	1.2E-04	--	6.0E-06	1.26E-04	Heart, Thymus, Blood	14.0	--	0.7	14.7
			vinyl chloride	2.9E-05	--	4.4E-07	2.94E-05	liver	0.04	--	0.001	0.04
			Chemical Total	8.5E-04		8.5E-06	9E-04		16.3	--	0.8	17
Groundwater Risk Total							9E-04					17
Total Risk							9E-04					17

HI - Liver and Kidney	0.6
HI- Kidney	1.1
HI - Neurological Effects	0.4
HI - Heart, thymus, blood	14.7

Central Tendency Exposure

Medium	Exposure Medium	Exposure Point	Chemicals of Concern	Carcinogenic Risk				Non-Cancer Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposue	Primary Target Organs	Ingestion	Inhalation	Dermal	Exposure
Bedrock/Till Groundwater	Tap Water	Tap Water	1,1-dichloroethane	3.00E-07	--	1.00E-08	3.10E-07	blood		--	0.0001	0.0001
			1,2,4-trichlorobenzene	2.00E-07	--	1.00E-07		kidney	0.005	--	0.004	0.009
			1,2-dichloroethane	5.00E-07	--	1.00E-08	5.10E-07	neurological effects	0.003	--	0.0001	0.003
			cis-1,2-dichloroethene	--	--	--		Kidney	0.6	--	0.03	0.6
			1,4-Dioxane	1.0E-04	--	2.1E-07	1.00E-04	Liver and Kidney	0.3	--	0.0007	0.3
			benzene	2.00E-06	--	1.00E-07	2.10E-06	blood	0.07	--	0.01	0.08
			chloroform	3.00E-07	--	2.00E-08	3.20E-07	liver	0.009	--	0.001	0.01
			Tetrachloroethylene	2.3E-07	--	7.9E-08	3.09E-07	Neurological effects	0.18	--	0.06	0.2
			Trichloroethylene	1.7E-05	--	1.7E-06	1.87E-05	Heart, Thymus, Blood	7.2	--	0.7	7.9
			vinyl chloride	4.0E-06	--	1.0E-07	4.10E-06	liver	0.02	--	0.0006	0.02
			Chemical Total	1.2E-04		2.3E-06	1.3E-04		8.4	--	0.8	9.2
Groundwater Risk Total							1E-04					9
Total Risk							1E-04					9

HI - Liver and Kidney	0.3
HI- Kidney	0.6
HI - Neurological Effects	0.2
HI - Heart, thymus, blood	7.9

-- indicates chemical not evaluated for carcinogenicity based on a lack of toxicity values.
*Inhalation risks were not calculated for the industrial worker since the risks to the resident from showering were below the risk range.

Table 6
Cleanup Goals
Scientific Chemical Processing Site, OU3 – Carlstadt, New Jersey

COC	MCL ug/l	NJ GWQS ug/l	Cleanup Goal ug/l
1,1-Dichloroethane	-	50	50
1,2,4-Trichlorobenzene	70	9	9
1,2-Dichloroethane	5	2	2
cis-1,2-Dichloroethene	70	70	70
1,4-Dioxane	-	10	10
Benzene	5	1	1
Chloroform	70	70	70
Tetrachloroethene	5	1	1
Trichloroethene	5	1	1
Vinyl Chloride	2	1	1

Notes:
MCL - Maximum Contaminant Level, the federal drinking water standard
NJ GWQS - New Jersey Groundwater Quality Standard
The Cleanup Goal is the lower of the MCL or the NJ GWQS
ug/l - micrograms per liter, or parts per billion (ppb)

APPENDIX III

ADMINISTRATIVE RECORD INDEX

ADMINISTRATIVE RECORD INDEX OF DOCUMENTS

FINAL

08/01/2012 **Region ID: 02**

Site Name: SCIENTIFIC CHEMICAL PROCESSING
CERCLIS: NJD070565403
OUID: 03
SSID: 0265
Action:

Region ID: 02
Doc ID: 123493
Bates: **To:**
Date: 08/01/2012
Pages: 9
Title: ADMINISTRATIVE RECORD INDEX FOR OU3 FOR THE SCIENTIFIC CHEMICAL PROCESSING SITE
Doc Type: INDEX

	Name	Organization
Author:	,	US ENVIRONMENTAL PROTECTION AGENCY REGION 2

	Name	Organization

Related Document(s):

Region ID: 02
Doc ID: 123882
Bates: R2-0000001 **To:** R2-0000270
Date: 12/21/1995
Pages: 270
Title: FINAL WORK PLAN AMENDMENT FOCUSED FEASIBILITY STUDY FIRST OPERABLE UNIT SOILS AND ADDITIONAL OFF-PROPERTY INVESTIGATION FOR THE 216 PATERSON PLANK ROAD SITE AND THE SCIENTIFIC CHEMICAL PROCESSING SUPERFUND SITE
Doc Type: PLAN

	Name	Organization
Author:	,	GOLDER ASSOCIATES INC

	Name	Organization
Addressee:	,	216 PATERSON PLANK ROAD COOPERATING PRP GROUP

Related Document(s):

ADMINISTRATIVE RECORD INDEX OF DOCUMENTS

FINAL

08/01/2012 **Region ID: 02**

Site Name: SCIENTIFIC CHEMICAL PROCESSING
CERCLIS: NJD070565403
OUID: 03
SSID: 0265
Action:

Region ID: 02
Doc ID: 123883
Bates: R2-0000271 **To:** R2-0000272
Date: 12/21/1995
Pages: 2
Title: TRANSMITTAL OF THE FINAL WORK PLAN AMENDMENT FOCUSED FEASIBILITY STUDY FIRST OPERABLE UNIT SOILS AND ADDITIONAL OFF-PROPERTY INVESTIGATION FOR 216 PATERSON PLANK ROAD SITE AND SCIENTIFIC CHEMICAL PROCESSING SUPERFUND SITE
Doc Type: LETTER

	Name	Organization
Author:	FINN, P. STEPHEN	GOLDER ASSOCIATES INC

	Name	Organization
Addressee:	PUVOGEL, RICHARD	EPA, REGION 2

Related Document(s):

Region ID: 02
Doc ID: 123884
Bates: R2-0000273 **To:** R2-0000643
Date: 01/22/1997
Pages: 371
Title: OFF-PROPERTY INVESTIGATION INTERIM DATA REPORT FOR THE 216 PATERSON PLANK ROAD SITE AND THE SCIENTIFIC CHEMICAL PROCESSING SUPERFUND SITE
Doc Type: REPORT

	Name	Organization
Author:	,	GOLDER ASSOCIATES INC

	Name	Organization
Addressee:	,	216 PATERSON PLANK ROAD COOPERATING PRP GROUP

Related Document(s):

Site Name: SCIENTIFIC CHEMICAL PROCESSING
CERCLIS: NJD070565403
OUID: 03
SSID: 0265
Action:

Region ID: 02
Doc ID: 123885
Bates: R2-0000644 **To:** R2-0000644
Date: 01/22/1997
Pages: 1
Title: TRANSMITTAL OF THE OFF-PROPERTY INVESTIGATION INTERIM DATA REPORT FORTHE 216 PATERSON PLANK ROAD SITE AND THE SCIENTIFIC CHEMICAL PROCESSING SUPERFUND SITE
Doc Type: LETTER

	Name	Organization
Author:	FINN, P. STEPHEN	GOLDER ASSOCIATES INC

	Name	Organization
Addressee:	,	EPA, REGION 2

Related Document(s):

Region ID: 02
Doc ID: 123886
Bates: R2-0000645 **To:** R2-0000675
Date: 06/04/2008
Pages: 31
Title: REMEDIAL ACTION OBJECTIVES AND REMEDIAL ALTERNATIVES FOR OU3 FOR THE 216 PATERSON PLANK ROAD SITE AND THE SCIENTIFIC CHEMICAL PROCESSING SUPERFUND SITE
Doc Type: REPORT

	Name	Organization
Author:	,	GOLDER ASSOCIATES INC

	Name	Organization
Addressee:	,	216 PATERSON PLANK ROAD COOPERATING PRP GROUP

Related Document(s):

ADMINISTRATIVE RECORD INDEX OF DOCUMENTS

FINAL

08/01/2012 **Region ID: 02**

Site Name: SCIENTIFIC CHEMICAL PROCESSING
CERCLIS: NJD070565403
OUID: 03
SSID: 0265
Action:

Region ID: 02
Doc ID: 123887
Bates: R2-0000676 **To:** R2-0000676
Date: 06/04/2008
Pages: 1
Title: TRANSMITTAL OF THE REMEDIAL ACTION OBJECTIVES AND REMEDIAL ALTERNATIVES FOR OU3 FOR THE 216 PATERSON PLANK ROAD SITE AND THE SCIENTIFIC CHEMICAL PROCESSING SUPERFUND SITE
Doc Type: LETTER

	Name	Organization
Author:	FINN, P. STEPHEN	GOLDER ASSOCIATES INC

	Name	Organization
Addressee:	VAUGHN, STEPHANIE	EPA

Related Document(s):

Region ID: 02
Doc ID: 123889
Bates: R2-0000677 **To:** R2-0000677
Date: 04/17/2009
Pages: 1
Title: E-MAIL REGARDING OU3 ADDITIONAL GROUNDWATER DELINEATION PLAN FOR THE 216 PATERSON PLANK ROAD SITE AND THE SCIENTIFIC CHEMICAL PROCESSING SUPERFUND SITE
Doc Type: E MAIL MESSAGE

	Name	Organization
Author:	FINN, P. STEPHEN	GOLDER ASSOCIATES INC

	Name	Organization
Addressee:	VAUGHN, STEPHANIE	EPA

Related Document(s):

Site Name: SCIENTIFIC CHEMICAL PROCESSING
CERCLIS: NJD070565403
OUID: 03
SSID: 0265
Action:

Region ID: 02
Doc ID: 123888
Bates: R2-0000678 **To:** R2-0000690
Date: 04/17/2009
Pages: 13
Title: WORK PLAN FOR ADDITIONAL GROUNDWATER DELINEATION FOR THE 216 PATERSON PLANK ROAD SITE AND THE SCIENTIFIC CHEMICAL PROCESSING SUPERFUND SITE
Doc Type: PLAN

	Name	Organization
Author:	,	GOLDER ASSOCIATES INC

	Name	Organization
Addressee:	,	EPA, REGION 2

Related Document(s):

Region ID: 02
Doc ID: 123881
Bates: R2-0000691 **To:** R2-0001222
Date: 07/01/2009
Pages: 532
Title: FINAL OFF-PROPERTY GROUNDWATER INVESTIGATION REPORT FOR OU3 FOR THE 216 PATERSON PLANK ROAD SITE AND THE SCIENTIFIC CHEMICAL PROCESSING SUPERFUND SITE
Doc Type: REPORT

	Name	Organization
Author:	,	GOLDER ASSOCIATES INC

	Name	Organization
Addressee:	,	216 PATERSON PLANK ROAD COOPERATING PRP GROUP

Related Document(s):

Site Name: SCIENTIFIC CHEMICAL PROCESSING
CERCLIS: NJD070565403
OUID: 03
SSID: 0265
Action:

Region ID: 02
Doc ID: 123890
Bates: R2-0001223 **To:** R2-0001224
Date: 12/09/2009
Pages: 2
Title: E-MAIL REGARDING OU3 DRILLING FOR THE 216 PATERSON PLANK ROAD SITE AND THE SCIENTIFIC CHEMICAL PROCESSING SUPERFUND SITE
Doc Type: E MAIL MESSAGE

	Name	Organization
Author:	FINN, P. STEPHEN	GOLDER ASSOCIATES INC

	Name	Organization
Addressee:	VAUGHN, STEPHANIE	EPA

Related Document(s):

Region ID: 02
Doc ID: 123891
Bates: R2-0001225 **To:** R2-0002477
Date: 09/02/2010
Pages: 1253
Title: FEASIBILITY STUDY PHASE 1 TREATABILITY STUDIES FOR OU3 FOR THE 216 PATERSON PLANK ROAD SITE ANDTHE SCIENTIFIC CHEMICAL PROCESSING SUPERFUND SITE
Doc Type: REPORT

	Name	Organization
Author:	,	GOLDER ASSOCIATES INC

	Name	Organization
Addressee:	,	216 PATERSON PLANK ROAD COOPERATING PRP GROUP

Related Document(s):

Site Name: SCIENTIFIC CHEMICAL PROCESSING
CERCLIS: NJD070565403
OUID: 03
SSID: 0265
Action:

Region ID: 02
Doc ID: 123892
Bates: R2-0002478 **To:** R2-0002478
Date: 09/02/2010
Pages: 1
Title: TRANSMITTAL OF THE FEASIBILITY STUDY PHASE 1 TREATABILITY STUDIES FOR OU3 FOR THE 216 PATERSON PLANK ROAD SITE AND THE SCIENTIFIC CHEMICAL PROCESSING SUPERFUND SITE
Doc Type: LETTER

	Name	Organization
Author:	FINN, P. STEPHEN	GOLDER ASSOCIATES INC

	Name	Organization
Addressee:	VAUGHN, STEPHANIE	EPA

Related Document(s):

Region ID: 02
Doc ID: 123880
Bates: R2-0002479 **To:** R2-0002483
Date: 06/21/2012
Pages: 5
Title: CORRESPONDENCE AND COMMENTS REGARDING THE REVISED DRAFT FINAL FOCUSED FEASIBILITY STUDY FOR OU3 FOR THE SCIENTIFIC CHEMICAL PROCESSING SUPERFUND SITE
Doc Type: LETTER

	Name	Organization
Author:	PETERSON, CAROLE	EPA

	Name	Organization
Addressee:	FINN, P. STEPHEN	GOLDER ASSOCIATES INC

Related Document(s):

Site Name: SCIENTIFIC CHEMICAL PROCESSING
CERCLIS: NJD070565403
OUID: 03
SSID: 0265
Action:

Region ID: 02
Doc ID: 123481
Bates: R2-0002484 **To:** R2-0002698
Date: 07/01/2012
Pages: 215
Title: BASELINE HUMAN HEALTH RISK ASSESSMENT FOR OU3 - OFF PROPERTY GROUNDWATER FOR THE 216 PATERSON PLANK ROAD SITE AND THE SCIENTIFIC CHEMICAL PROCESSING SUPERFUND SITE
Doc Type: REPORT

	Name	Organization
Author:	,	GOLDER ASSOCIATES INC

	Name	Organization
Addressee:	,	US ENVIRONMENTAL PROTECTION AGENCY REGION 2

Related Document(s):

Region ID: 02
Doc ID: 123482
Bates: R2-0002699 **To:** R2-0002794
Date: 07/01/2012
Pages: 96
Title: FOCUSED FEASIBILITY STUDY FOR OU3 - OFF PROPERTY GROUNDWATER FOR THE 216 PATERSON PLANK ROAD SITE AND THE SCIENTIFIC CHEMICAL PROCESSING SUPERFUND SITE
Doc Type: REPORT

	Name	Organization
Author:	,	GOLDER ASSOCIATES INC

	Name	Organization
Addressee:	,	US ENVIRONMENTAL PROTECTION AGENCY REGION 2

Related Document(s):

FINAL

08/01/2012 **Region ID: 02**

Site Name: SCIENTIFIC CHEMICAL PROCESSING
CERCLIS: NJD070565403
OUID: 03
SSID: 0265
Action:

Region ID: 02
Doc ID: 123495
Bates: R2-0002795 **To:** R2-0002805
Date: 08/01/2012
Pages: 11
Title: PROPOSED PLAN FOR OU3 FOR THE SCIENTIFIC CHEMICAL PROCESSING SITE
Doc Type: PLAN

	Name	Organization
Author:	,	US ENVIRONMENTAL PROTECTION AGENCY

Name	Organization

Related Document(s):

APPENDIX IV

STATE CONCURRENCE LETTER

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

September 20, 2012

Mr. Walter Mugdan, Director
Emergency and Remedial Response Division
U.S. Environmental Protection Agency Region II
290 Broadway
New York, NY 10007-1866

Re: Scientific Chemical Processing Superfund Site
Record of Decision for OU3
Carlstadt, Bergen County

Dear Mr. Mugdan:

The New Jersey Department of Environmental Protection (Department) has completed its review of the Record of Decision (ROD) Operable Unit 3 (OU3), that addresses the off-property and deep groundwater, prepared by the U.S. Environmental Protection Agency (EPA) Region II. The Department concurs with the selected remedy, namely Alternative 2 - In-Situ Treatment, Monitored Natural Attenuation, and Institutional Controls.

The selected remedy was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act, as amended, and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan. This decision is based on the Administrative Record file for this site. The response action selected in this Record of Decision (ROD) is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

The remedy selected to address off-property and deep groundwater contamination employs the use of in-situ treatment technologies and includes the following major components:

- Enhanced anaerobic bioremediation in the Northern Area;
- In-situ chemical oxidation in the Southern area;
- Monitored natural attenuation after treatment;
- Institution controls consisting of a Classification Exception Area and a Well Restriction Area, to limit future use of the groundwater until remediation goals are met.

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to the remedial action, is cost effective, and uses permanent solutions and treatment technologies to the maximum extent practicable.

DEP appreciates the opportunity to participate in the decision making process to select an appropriate remedy. If you have any questions, please call me at 609-292-1250.

Sincerely,

David Sweeney
Assistant Commissioner
Site Remediation Program

cc: Gwen Zervas, BCM

APPENDIX V

RESPONSIVENESS SUMMARY

APPENDIX V

RESPONSIVENESS SUMMARY
SCIENTIFIC CHEMICAL PROCESSING SUPERFUND SITE
OPERABLE UNIT 3

INTRODUCTION

This Responsiveness Summary provides a summary of the public=s comments on and concerns with the Proposed Plan to address Operable Unit 3 (OU3) of the Scientific Chemical Processing (SCP) Superfund Site, and the U.S. Environmental Protection Agency=s (EPA=s) responses to these comments and concerns. At the time of the public comment period, EPA proposed a preferred alternative for addressing the off-property and deep groundwater at the Site, which has been designated OU3. All comments summarized in this document have been considered in EPA=s final decision for selection of a remedial alternative for OU3.

This Responsiveness Summary is divided into the following sections:

I. BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS: This section provides the history of community involvement and interests regarding the Site.

II. COMPREHENSIVE SUMMARY OF MAJOR QUESTIONS, COMMENTS, CONCERNS AND RESPONSES: This section contains summaries of oral comments received by EPA at the public meeting, EPA=s responses to these comments, as well as responses to written comments received during the public comment period.

The last section of this Responsiveness Summary includes attachments which document public participation in the remedy selection process for this Site. They are as follows:

Attachment A contains the Proposed Plan that was issued on August 3, 2012 and distributed to the public for review and comment;

Attachment B contains the public notice that appeared in The South Bergenite;

Attachment C contains the transcript of the public meeting; and

Attachment D contains the written comments received by EPA during the public comment period.

I. BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS

Aside from periodic interaction with the adjacent industrial land owners, since the issuance of the OU1 Record of Decision in September 1990, the level of community interest in the SCP Site has been low. EPA and the Potentially Responsible Parties (PRPs) have addressed relatively minor issues mainly regarding property access for off-site well sampling/installation, general concerns about drinking water quality in the area and issues about Site aesthetics. In response to local concerns, the PRPs planted evergreen shrubbery on the Paterson Plank Road side of the Site, and painted the on-site groundwater temporary storage tank that was used prior to implementation of the OU2 remedy. Since these actions were taken, there have been no major concerns raised by the local community about aesthetics.

OU1 Remedy: The RI/FS Report, the Proposed Plan and other documents which comprise the administrative record of the interim remedy (i.e., OU1) were released to the public on May 19, 1990. These documents were made available to the public at the William E. Dermody Free Library in Carlstadt, New Jersey. On May 19, 1990, EPA also published a notice in the Bergen Record which contained information relevant to the public comment period for the Site, including the duration of the public comment period, the date of the public meeting and availability of the administrative record. The public comment period began on May 19, 1990 and ended on June 18, 1990. In addition, a public meeting was held on June 5, 1990, at which representatives from EPA and the New Jersey Department of Environmental Protection (NJDEP) answered questions regarding the Site and the interim actions under consideration. Responses to the significant comments received during the public comment period are included in the 1990 ROD=s Responsiveness Summary.

OU2 Remedy: The RI/FS Report, Proposed Plan and other documents which comprise the administrative record for the final on-property soil and shallow groundwater remedy (i.e., OU2) were released to the public on August 15, 2001. These documents were also made available to the public at the William E. Dermody Free Public Library. A public notice was published in the Bergen Record on August 15, 2001, advising the public of the availability of the administrative record, the duration of the public comment period, and the date of the public meeting. Due to disruption of mail delivery to EPA=s offices in downtown Manhattan, relating to the events of September 11, 2001, a second public notice was published in the Bergen Record on October 12, 2001 extending the comment period until October 25, 2001. A public meeting, during which EPA presented the preferred remedial alternative for OU2, was held at the Carlstadt Borough Hall, 500 Madison Street, Carlstadt, New Jersey on August 23, 2001. Responses to the significant comments received during the public comment period are included in the August 2002 ROD.

OU3 Remedy: The RI/FS Report, Proposed Plan and other documents which comprise the administrative record for the off-property and deep groundwater remedy (i.e., OU3) were released to the public on August 3, 2012. These documents were also made available to the public at the William E. Dermody Free Public Library in Carlstadt. A public notice was published in the South Bergenite on August 2, 2012, advising the public of the availability of the administrative record, the duration of the public comment period, and the date of the public meeting. The public comment period began on August 3, 2012 and ended on September 4, 2012. A public meeting was held on August 9, 2012, at which representatives from EPA presented the preferred alternative for OU3, was held at the Carlstadt Borough Hall. A summary of the significant comments received during that meeting and during the public comment period are contained herein.

II. COMPREHENSIVE SUMMARY OF MAJOR QUESTIONS, COMMENTS, CONCERNS, AND RESPONSES

This section summarizes comments received from the public during the public comment period, and EPA=s responses.

A. SUMMARY OF QUESTIONS AND EPA=s RESPONSE FROM THE PUBLIC MEETING CONCERNING THE SCIENTIFIC CHEMICAL PROCESSING SITE, OPERABLE UNIT 3 - AUGUST 9, 2012

A public meeting was held on August 9, 2012 at 7:00 p.m. at the Carlstadt Borough Hall, 500 Madison St., Carlstadt, NJ. EPA and the PRP=s consultant gave a presentation on the investigation findings, the Proposed Plan, and the preferred alternative for the SCP Site.

Comment #1: A commenter questioned the purpose of the remedy, particularly since there is no current exposure to the OU3 contamination and, thus, no risk posed by the Site. He questioned why EPA did not, instead, recommend placement of a Classification Exception Area around the affected area, to restrict future access to groundwater, with monitoring to assure effectiveness, particularly given the Site's location in a commercial/industrial area.

EPA Response: Both the till and bedrock aquifers are designated as Class IIA groundwater by the State of New Jersey, which means they are potential sources of drinking water. As such, the goal is to restore the aquifers so that they can be available as drinking water sources.

Comment #2: A commenter asked whether the primary purpose of the remedy was to accelerate cleanup of the contaminated area, since natural attenuation processes are occurring, or to actually address the source of contamination.

EPA Response: The goal of the remedy is to both address the source of contamination and to accelerate the cleanup of the contaminated area. The proposed in-situ treatment plan will include injection points within the source area, to enhance or cause the breakdown of contaminants of concern, and thus accelerate the overall cleanup of the groundwater.

Comment #3: A commenter asked whether the costs of the proposed remedy were justified, given that natural attenuation is occurring. He wondered whether monitoring, with institutional controls, should be the preferred remedy.

EPA Response: The majority of costs from the proposed remedy actually relate to the monitoring that will need to occur over an estimated 30 years. The upfront capital cost for implementing the active portion of the remedy (i.e., the in-situ treatment) is estimated to be

approximately $1.8 million, while the monitoring costs associated with the remedy are estimated to be closer to $9.4 million. By actively treating the source of contamination, the timeframe to achieve cleanup goals should be shorter than through allowing natural attenuation processes to address the contamination alone, and thus, in the long run, costs may actually be lower for the active remedy.
Further, at least one of the contaminants of concern at the Site, 1,4-dioxane, does not naturally attenuate, and thus, at least some active treatment is required.

Comment #4: A representative of the Borough of Carlstadt, the owner of the former SCP property, asked when the property would be available for use.

EPA Response: Once the Record of Decision is signed, the design of the remedy will be initiated. After the design is complete, or at least well under way, the footprint of the Site that will be required to implement the remedy will be known, and long-term redevelopment plans can be made. Overall, any redevelopment of the Site cannot affect the existing OU2 remedy or the future OU3 remedy. As such, prior to the Site being used in any way, the borough must contact EPA to review its plans. That said, EPA supports appropriate reuse of the Site and will assist the borough as best it can to develop a viable option or options for reuse.

C. WRITTEN COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD FROM THE COMMUNITY AND PRP

Comments and concerns were accepted in writing during the public comment period. One written comment was received in an email from a consulting firm located in Australia. It is addressed in the following part of the Responsiveness Summary.

Comment #5: Mr. Roger Lamb, in his August 8, 2012 email to EPA, asked whether state-of-the-art assessment of volatile organic compounds in 3D, using direct sensing tools, has been performed at the Site. He expressed concern that the in-situ remedy will not be successful without the use of advanced site characterization techniques.

EPA Response: Mr. Lamb’s email was forwarded to the PRPs for consideration in their design of the remedy.

ATTACHMENT A

PROPOSED PLAN

Superfund Program
Proposed Plan

U.S. Environmental Protection Agency
Region II

Scientific Chemical Processing Site
August 2012

EPA ANNOUNCES PROPOSED PLAN

This Proposed Plan identifies the U.S. Environmental Protection Agency's (EPA's) Preferred Alternative for addressing off-property and deep groundwater contamination at the Scientific Chemical Processing (SCP) Superfund Site (Site) in the Borough of Carlstadt, New Jersey. The Preferred Alternative for the contaminated groundwater is in-situ treatment, monitored natural attenuation and institutional controls. This Proposed Plan includes summaries of the cleanup alternatives that were evaluated for use at the Site. This document is issued by EPA, the lead agency for the Site, in conjunction with the New Jersey Department of Environmental Protection (NJDEP), the support agency.

EPA is issuing this document as part of its public participation responsibilities under Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), and Section 300.435 (c)(2)(ii) of the NCP. This document summarizes information that can be found in detail in the Administrative Record file for the Site. This Proposed Plan is being provided to inform the public of EPA's preferred remedy, and to solicit public comments pertaining to the preferred alternative. The remedy described in this Proposed Plan is the preferred remedy for the Site. Changes to the preferred remedy, or a change from the preferred remedy to another remedy, may be made if public comments or additional data indicate that such a change will result in a more appropriate remedial action. The final decision regarding the selected remedy will be made after EPA has taken all public comments into consideration. Therefore, the public is encouraged to review and comment on the preferred alternative considered by EPA in this Proposed Plan.

MARK YOUR CALENDAR

PUBLIC COMMENT PERIOD:

August 3, 2012 – September 4, 2012

EPA will accept written comments on the Proposed Plan during the public comment period.

PUBLIC MEETING:
August 9, 2012

EPA will hold a public meeting to explain the preferred remedy presented in the Proposed Plan. Oral and written comments will also be accepted at the meeting. The meeting will be held at the Carlstadt Borough Hall, located at 500 Madison Street, Carlstadt, New Jersey at 7:00 p.m.

For more information, see the Administrative Record at the following locations:

EPA Records Center, Region II
290 Broadway, 18th Floor
New York, New York 10007-1866
(212) 637-3261
Hours: Monday - Friday 9:00 am to 5:00 pm

The William E. Dermody Public Library
420 Hackensack Street
Carlstadt, NJ 07072
(201) 438-8866
Hours: Monday - Thursday 10:00 am to 9:00 pm, Friday 10:00 am to 5:00 pm, Saturday 10:00 am to 2:00 pm (closed Saturdays in July and August)

SITE HISTORY

The former SCP property lies at the corner of Paterson Plank Road (Route 120) and Gotham Parkway in Carlstadt, New Jersey. Peach Island Creek, a tributary to Berry's Creek, forms the northeastern border of the property and a trucking company forms the southeastern border (see Figure 1).

The land use in the vicinity of the Site is classified as light industrial by the Borough of Carlstadt. The establishments in the immediate vicinity of the Site include a bank, horse stables, warehouses, freight carriers, and service sector industries. There is a residential area located approximately 1.2 miles northwest of the Site.

The land on which the former SCP property is located was purchased in 1941 by Patrick Marrone, who used the land for solvent refining and solvent recovery. Mr. Marrone eventually sold the land to a predecessor of Inmar Associates, Inc. Aerial photographs from the 1950s, 1960s and 1970s indicate that drummed materials were stored on the property. On October 31, 1970, the Scientific Chemical Processing Company leased the property from Inmar Associates. SCP used the property for processing industrial wastes from 1971 until the company was shut down by court order in 1980.

While in operation, SCP received liquid byproduct streams from chemical and industrial manufacturing firms, and then processed the materials to reclaim marketable products which were sold to the originating companies. In addition, liquid hydrocarbons were processed to some extent, and then blended with fuel oil. The mixtures were typically sold back to the originating companies or to cement and aggregate kilns as fuel. SCP also received other wastes, including paint sludges, acids and other unknown chemical wastes.

In 1983, the Site was placed on the National Priorities List. Between 1983 and 1985, NJDEP required the property owner to remove approximately 250,000 gallons of wastes stored in tanks which had been abandoned at the Site.

In May 1985, EPA assumed the lead role in the response actions, and issued notice letters to more than 140 Potentially Responsible Parties (PRPs). EPA offered the PRPs an opportunity to perform a Remedial Investigation and Feasibility Study (RI/FS) for the Site, and in September 1985, EPA issued an Administrative Order on Consent to the 108 PRPs who had agreed to conduct the RI/FS. Subsequently, in October 1985, EPA issued a Unilateral Order to 31 PRPs who failed to sign the Consent Order. The Unilateral Order required the 31 PRPs to cooperate with the 108 consenting PRPs on the RI/FS. In the fall of 1985, EPA also issued an Administrative Order to Inmar Associates, requiring the company to remove and properly dispose of the contents of five tanks containing wastes contaminated with Polychlorinated Biphenyls (PCBs) and numerous other hazardous substances.

Inmar removed four of the five tanks remaining on the property in 1986. The fifth tank was not removed at the time because it contained high levels of PCBs and other contaminants, and disposal facilities capable of handling those wastes were not available at that time. The fifth tank and its contents were subsequently removed by the PRPs in February 1998 and disposed of at an EPA-approved off-site facility.

The PRPs initiated the RI/FS in April 1987, and it was completed in March 1990. The RI focused on the most heavily contaminated zone at the Site, which included the contaminated soil, sludge, and shallow groundwater within the SCP property, down to the clay layer (hereinafter, this zone will be referred to as the "Fill Area"). The RI also included data from the deeper groundwater areas, both on and off the SCP property. The deeper areas consist of the till aquifer, which lies just under the Fill Area's clay layer, and the bedrock aquifer, which underlies the till aquifer. Groundwater within both the till and bedrock aquifer was found to be contaminated with site-related compounds. The RI also found that the adjacent Peach Island Creek's surface water and sediments were impacted by contaminants similar to those found in the Fill Area.

The FS indicated that, although there seemed to be several potential methods or combinations of methods to remedy the Fill Area, there were uncertainties regarding the relative effectiveness of the various technologies. Consequently, EPA made a decision that treatment alternatives needed further assessment. In the meantime, however, measures were needed to contain and prevent exposure to the Fill Area contaminants. As such, an interim remedy for the on-property soil and shallow groundwater was selected in a September 1990 Record of Decision (ROD).

EPA typically addresses sites in separate phases and/or operable units. In developing an overall strategy for the Site, EPA has identified the interim Fill Area remedy as Operable Unit 1 (OU1), the final Fill Area remedy as OU2, and the off-property and deep groundwater remedy, which is the subject of this Proposed Plan, as OU3. Contamination in the adjacent Peach Island Creek will be addressed as part of another superfund site, Berry's Creek. Peach Island Creek is a tributary to Berry's Creek.

Interim Remedy: Soil and Shallow Groundwater on Property (OU1)

The goals of the interim remedy selected for OU1 were to prevent exposure to contaminated soil and sludge in the Fill Area and to prevent the contaminated groundwater within the Fill Area from migrating off-property. The interim remedy was constructed from August 1991 through June 1992 by the PRPs for the Site, with EPA oversight, pursuant to a Unilateral

Administrative Order dated September 28, 1990, and consisted of the following:

- A lateral containment wall comprised of a soil-bentonite slurry with an integral high density polyethylene (HDPE) vertical membrane surrounds the Fill Area and is keyed into the clay layer;

- A sheet pile retaining wall along Peach Island Creek;

- An HDPE horizontal infiltration barrier covering the property;

- An extraction system for shallow groundwater within the containment area with discharge to an above-ground storage tank for off-site disposal;

- A chain link fence around the property to restrict access; and

- Regular groundwater sampling, plus monitoring of the interim remedy to assure it remained effective until a final remedy was selected.

Final Remedy: Soil and Shallow Groundwater on Property (OU2)

While implementing the OU1 remedy, EPA continued to oversee additional RI/FS work which would provide information to select a final remedy for the Fill Area, as well as a remedy for the deep and off-property groundwater. A ROD selecting the Final Remedy for the Fill Area (OU2) was signed in August 2002. The major elements of the selected remedy included:

- Treatment of a Hot Spot area of contamination to reduce concentrations of volatile organic compounds, followed by soil stabilization of the area using cement and lime. If the treatment did not prove effective, the ROD specified that excavation of the Hot Spot area, with off-site disposal, would occur;

- Installation of a 2-foot thick "double containment" cover system over the entire Fill Area;

- Improvement of the existing, interim groundwater recovery system; and

- Improvement of the existing sheet pile wall along Peach Island Creek.

The OU2 remedy was implemented by the PRPs, with EPA oversight, pursuant to a Consent Decree entered in September 2004. Design of the remedy was completed in June 2007 and construction of the remedy was initiated in April 2008. Performance standards for the treatment and stabilization of the Hot Spot area of contamination were not met. As such, sludge and soil from the area was excavated and disposed of at an EPA-approved off-site disposal facility.

Implementation of the OU2 remedy was completed in October 2011. The groundwater recovery system is operating and regular maintenance is being conducted.

Off-Property and Deep Groundwater (OU3)

OU3 includes groundwater located outside of the boundaries of the former SCP property, as well as groundwater beneath the property, but deeper than the limits of the OU2 remedy (i.e., below the clay layer, in the till and bedrock aquifers). Investigation of OU3 groundwater has been ongoing since the initiation the RI for the Site in 1987. An Interim Data Report was submitted by the PRPs in 1997, and an Off-Property Groundwater Investigation Report was submitted in May 2003.

After reviewing the May 2003 report, EPA determined that additional investigation was needed to further define the nature and extent of groundwater contamination in the till and bedrock aquifers. The scope of the additional investigation was agreed to at a meeting with EPA in November 2006, and the associated fieldwork was conducted between March and July 2007. The Final Off-Property Groundwater Investigation Report for Operable Unit 3 (the Final RI for OU3) was submitted by the PRPs in July 2009.

A remedial action objectives and remedial alternatives (RAO/RA) report, identifying a preliminary list of remedial technologies for OU3, was submitted to EPA by the PRPs in June 2008. The RAO/RA report also proposed that bench and, possibly, pilot-scale studies be conducted to test the efficacy of certain remedial technologies for use at this Site.

Additional groundwater investigations were performed in advance of the bench and pilot-scale treatability studies that were conducted to support the OU3 FS. This additional investigation work was conducted in December 2009 and January 2010 in accordance with a work plan for additional groundwater delineation submitted by the PRPs in April 2009. The results were reported in an OU3 FS Phase 1 Treatability Studies report dated September 2010, which proposed further delineation activities and provided a work plan for an enhanced anaerobic bioremediation pilot test that is ongoing at the Site.

The OU3 RI/FS was completed in July 2012. The results of the OU3 RI are summarized below, and form the basis for the development of the FS report. Both documents, as well as the OU3 Human Health Risk Assessment, can be found in the Administrative Record for the Site.

SITE CHARACTERISTICS

The stratigraphy at the Site consists of the following layers:

- Man made fill (3 to 10 feet thick)
- Marine and marsh “meadow mat” (0 to 4 feet thick)
- Glaciolacustrine varved clay unit, including an upper stiff bedded unit and a lower soft plastic unit (0 to 20 feet thick)
- Glacial till, including a soft upper unit (0 to 17 feet thick) and an over-consolidated lower lodgement till (0 to 30 feet thick)
- Passaic Formation bedrock consisting of siltstones and mudstones with occasional interbeds of sandstones.

The geologic layers that are most relevant to OU3 include the glaciolacustrine varved material, which serves as a confining layer, and the underlying glacial till and bedrock aquifers, which are designated as Class IIA groundwater by the State of New Jersey, which means they are potential sources of drinking water. However, no wells in the affected area are used for potable water purposes.

Groundwater generally flows to the north from the property. However, the flow direction and water levels are significantly influenced by the presence of several extraction wells in the vicinity, used for non-residential, non-potable water purposes, which operate during the week and then sit idle during the weekend. During the weekend, flows can actually reverse direction and head south, away from the property, or more generally can flow towards the northwest.

Sampling Results

The results of the RI are summarized in the final report dated July 2009. Additional sampling conducted since that time has been incorporated into the FS for OU3.

The primary contaminants of concern in groundwater at the Site include Volatile Organic Compounds (VOCs), predominantly tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene (DCE), and vinyl chloride, localized areas of aromatic hydrocarbons, including benzene, toluene, ethylbenzene, and xylenes, and 1,4-dioxane.

There are two distinct areas of contamination in the OU3 groundwater. They are described separately below.

Northern Area Contamination

The primary contaminants of concern in the northern area are the VOCs mentioned above. Concentrations decrease substantially with increasing horizontal and vertical distance from the former SCP property. For example, the highest concentrations of total VOCs in the bedrock, approximately 3,000 parts per billion (ppb), were found in Monitoring Well -13R (MW-13R), which is located adjacent to the northwest corner of the former SCP property. Total VOC concentrations decrease to trace levels in the bedrock just 600 to 1,000 feet away horizontally. Concentrations also decline vertically, with only trace VOC concentrations detected in MW-23R, located adjacent to but deeper than MW-13R.

Similarly, the highest concentration of total VOCs detected in the till wells was approximately 5,500 ppb in MW-5D, which is located in the northwest corner of the property, and draws water from beneath the OU2 containment remedy. Concentrations in the till aquifer decline to 718 ppb in MW-20D, located approximately 500 feet north of the property, to 5 ppb in MW-26D, located approximately 950 feet north of the property. Total VOC concentrations also decline to 51 ppb in MW-25D, approximately 1,000 feet northwest of the property.

Southern Area Contamination

The primary contaminant of concern that defines the contamination to the south of the property is 1,4-dioxane, though other contaminants, including benzene and 1,1-dichloroethane, are also present at elevated concentrations. 1,4-dioxane has been detected in groundwater in the southern area at concentrations ranging from 5 ppb to 6,300 ppb. The highest concentrations were observed in the soft till, and were an order of magnitude higher than in groundwater samples collected in the deeper, lodgement till.

1,4-dioxane does not appear to be present above concentrations of concern in the bedrock aquifer.

SCOPE AND ROLE OF THIS ACTION

As stated previously, EPA is addressing this Site in three operable units, two of which have already been implemented. OU1 provided an interim infiltration barrier, slurry wall, groundwater collection system, and off-site disposal of contaminated groundwater. OU2 improved upon and made permanent the OU1 remedy. It constituted the final remedy for the Fill Area of the Site. OU3, the final operable unit and the subject of this Proposed Plan, addresses contaminated groundwater in the deeper aquifers where contamination extends off-property and under the OU2 containment area. The Remedial Action Objectives for OU3 are to prevent unacceptable exposures to impacted groundwater, control future migration of contaminants of concern in the groundwater, and restore groundwater quality to regulatory or risk-based concentrations.

SUMMARY OF OPERABLE UNIT 3 RISKS

The purpose of a human health risk assessment is to identify potential cancer risks and non-cancer health hazards at a site assuming that no further remedial action is taken. A baseline human health risk assessment (BHHRA) was performed to evaluate current and future cancer risks and non-cancer health hazards based on the results of the RI.

An ecological risk assessment was determined to be unnecessary for OU3. The OU2 remedy specified that ecological risks would be addressed as part of the OU3 remedy. However, at that time, Peach Island Creek was to be addressed as part of the Site. However, contamination in the creek, and any associated ecological risks, will now be addressed as part of the Berry's Creek site.

Human Health Risk Assessment

As part of the RI, a BHHRA was conducted to estimate the risks and hazards associated with the current and future effects of contaminants on human health. A BHHRA is an analysis of the potential adverse human health effects caused by hazardous substance exposure in the absence of any actions to control or mitigate exposure under current and future land uses. The BHHRA for OU3 considered exposure to Chemicals of Potential Concern (COPCs) in the bedrock and till groundwater aquifers assuming no remediation and no institutional controls.

WHAT IS RISK AND HOW IS IT CALCULATED?

A Superfund baseline human health risk assessment is an analysis of the potential adverse health effects caused by hazardous substance releases from a site in the absence of any actions to control or mitigate these under current and future land uses. A four-step process is utilized for assessing site-related human health risks for reasonable maximum exposure scenarios.

Hazard Identification: In this step, the contaminants of concern at the site in various media (i.e., soil, groundwater, surface water, and air) are identified based on such factors as toxicity, frequency of occurrence, fate and transport of the contaminants in the environment, concentrations of the contaminants in specific media, mobility, persistence, and bioaccumulation.

Exposure Assessment: In this step, the different exposure pathways through which people might be exposed to the contaminants identified in the previous step are evaluated. Examples of exposure pathways for a groundwater site include ingestion of groundwater and inhalation of volatiles while showering. Factors relating to the exposure assessment include, but are not limited to, the concentrations that people might be exposed to and the potential frequency and duration of exposure. Using these factors, a "reasonable maximum exposure" scenario, which portrays the highest level of human exposure that could reasonably be expected to occur, is calculated.

Toxicity Assessment: In this step, the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure (dose) and severity of adverse effects (response) are determined. Potential health effects are chemical- specific and may include the risk of developing cancer over a lifetime or other non-cancer health effects, such as changes in the normal functions of organs within the body (e.g., changes in the effectiveness of the immune system). Some chemicals are capable of causing both cancer and non-cancer health effects.

Risk Characterization: This step summarizes and combines exposure information and toxicity assessments to provide a quantitative assessment of site risks. Exposures are evaluated based on the potential risk for developing cancer and the potential for non-cancer health hazards. The likelihood of an individual developing cancer is expressed as a probability. For example, a 10^{-4} cancer risk means a "one in ten thousand excess cancer risk"; or one additional cancer may be seen in a population of 10,000 people as a result of exposure to site contaminants under the conditions explained in the exposure assessment. Current federal Superfund guidelines for acceptable exposures are an individual lifetime excess cancer risk in the range of 10^{-4} to 10^{-6} (corresponding to a one-in-ten-thousand to a one-in-a-million excess cancer risk). For non-cancer health effects, a "hazard index" (HI) is calculated. An HI represents the sum of the individual exposure levels compared to their corresponding Reference Doses. The key concept for a non-cancer HI is that a "threshold level" (measured as an HI of 1) exists below which non-cancer health effects are not expected to occur.

A four-step human health risk assessment process was used for assessing site-related cancer risks and non-cancer health hazards. The four-step process is comprised of: Hazard Identification of COPCs, Exposure Assessment, Toxicity Assessment, and Risk Characterization (see "What Is Risk and How Is It Calculated" box on previous page).

The current/future land use scenarios evaluated in the BHHRA included the following exposure pathways and receptors:

- Adult/Child Residents: ingestion of, dermal contact with, and inhalation of vapors from OU3 groundwater.

- Industrial Workers: ingestion of and dermal contact with OU3 groundwater.

There are currently no known exposures to OU3 groundwater, and it is not used a potable source, so the BHHRA focused on future risk conditions.

Exposure point concentrations in groundwater were estimated using either the maximum detected concentration of a contaminant or the 95%, 97.5% or 99% upper-confidence limit (UCL) of the average concentration. Chronic daily intakes were calculated based on the reasonable maximum exposure (RME), which is the highest exposure reasonably anticipated to occur at the Site. The RME is intended to represent a conservative exposure scenario that is still within the range of possible exposures. Central tendency exposure (CTE) assumptions, which represent typical, average exposures, were also developed. A complete summary of all exposure scenarios can be found in the BHHRA.

Summary of Risks to Future Residents
The carcinogenic risk calculated for future adult residents under RME conditions was $3x10^{-3}$ (three in 1,000), which exceeds the acceptable risk range of 10^{-4} (one in 10,000) to 10^{-6} (one in 1,000,000). The risk is due primarily to ingestion of 1,4-dioxane (77%) and TCE (13%) in the groundwater. The total estimated adult cancer risk calculated using CTE assumptions was $4x10^{-4}$ (4 in 10,000), which is within the upper bounds of the acceptable risk range.

The carcinogenic risk calculated for future child residents under RME conditions was $2x10^{-3}$ (2 in 1,000), which is due primarily to the ingestion of 1,4-dioxane (45%) and TCE (41%) in the groundwater. The total estimated future child cancer risk under CTE conditions was calculated to be $1x10^{-3}$ (one in 1,000), which still exceeds the risk range.

The non-cancer Hazard Index (HI) calculated for future adult residents was 54 under RME conditions and 25 under CTE conditions. Both of these exceed the goal of protection of an HI of less than 1. The primary COPCs in groundwater contributing to the total HI are 1,4-dioxane, TCE and cis-1,2-dichloroethene.

For future child residents, the total HI was calculated to be 125 under RME conditions and 63 under CTE conditions, due primarily to ingestion of 1,4-dioxane,cis-1,2-dichloroethene, TCE and PCE in groundwater. Again, the overall HI is greater than the goal of protection of an HI of less than 1 for both the RME and CTE exposures.

An evaluation of cancer risks and non-cancer hazards associated with showering were found to be below the cancer risk range and an HI of 1 for potential future residents.

Summary of Risks to Industrial Workers
Under future exposure conditions, the sum of all RME cancer risks for the adult industrial/commercial worker was calculated to be $9x10^{-4}$ (9 in 10,000), which exceeds the acceptable risk range. Estimated risks are primarily driven by ingestion of 1,4-dioxane (78%) and TCE (13%) in groundwater. The total estimated cancer risk under CTE conditions was calculated to be $4x10^{-4}$ (4 in 10,000), which is within the upper bounds of the acceptable risk range.

The total estimated non-cancer HI for future industrial/commercial workers was calculated to be 19 under RME conditions and 10 under CTE conditions, due primarily by the ingestion of TCE in groundwater. The overall HI is greater than the goal of protection of an HI of less than 1 under both RME and CTE exposure conditions.

Summary
The results of the BHHRA indicate that action is necessary to reduce the risks associated with contamination in the OU3 groundwater. In addition, it is EPA's judgment that the Preferred Alternative identified in this Proposed Plan is necessary to protect public health or welfare from actual or threatened releases of hazardous substances into the environment.

REMEDIAL ACTION OBJECTIVES

Based on the human health risk assessment, the primary contaminants of concern in the deep and off-property groundwater are VOCs, aromatic hydrocarbons, and 1,4-dioxane. There are no current completed exposure pathways to OU3 groundwater, but future exposure pathways are associated with potential groundwater extraction and use via ingestion, inhalation and dermal contact routes. The vapor intrusion pathway is not a concern due to the depth of the OU3 groundwater. The relatively clean shallow groundwater (5 to 10 feet below ground surface) would effectively block the potential migration of volatile contaminants from the deeper groundwater (more than 30 feet below ground surface) to the surface.

The following remedial action objectives address the human health risks and environmental concerns posed at the Site:

- Prevent unacceptable exposures to impacted groundwater;
- Control future migration of contaminants of concern in the groundwater; and
- Restore groundwater quality to the lower of the federal drinking water standards or the New Jersey Groundwater Quality Standards (NJGWQSs).

The cleanup of the Site is based on remediating the contaminated groundwater to within EPA's acceptable cancer risk range for a reasonable maximum exposure if the groundwater were utilized in the future for residential purposes. The cleanup goals also have to be consistent with federal drinking water standards and NJGWQSs. The Preliminary Remediation Goals proposed by EPA for the contaminants of potential concern for OU3 are based on the NJGWQSs, and are consistent with federal and state guidance.

SUMMARY OF REMEDIAL ALTERNATIVES

Remedial alternatives for the off-property groundwater are presented below. Potential applicable technologies were initially identified and screened using effectiveness, implementability, and cost as criteria, with an emphasis on the effectiveness of the alternative. Those technologies that passed the initial screening were then assembled into three remedial alternatives which were fully evaluated in the FS.

The time frames below for construction do not include the time to design the remedy or to procure necessary contracts. Because each of the action alternatives are expected to take longer than five years, a Site review will be conducted every five years (Five-Year Review) until remedial goals are achieved.

Alternative 1 – No Action

Regulations governing the Superfund program require that the "no action" alternative be evaluated generally to establish a baseline for comparison. Under this alternative, EPA would take no action at the Site to prevent exposure to the groundwater contamination.

Total Capital Cost	$0
Total Operation and Maintenance	$0
Total Present Worth Cost	$0
Estimated Timeframe	None

Alternative 2 – In-Situ Treatment, Monitored Natural Attenuation, and Institutional Controls

Total Capital Cost	$1,772,439
Total Operation and Maintenance	$9,410,460
Total Present Worth Cost	$7,830,000
Estimated Timeframe	30 years

This alternative would treat the contamination in the groundwater directly, through the injection of a substance, or substances, designed to cause or enhance the breakdown of the contaminants of concern to less toxic forms.

As described above, there are two distinct areas of contamination for OU3. A bench-scale test was conducted on the southern portion of the plume and a long-term, pilot-scale test is nearing completion in the northern portion of the plume. Both tests indicate that in-situ treatment technologies can effectively remediate the contamination that is present in the OU3 groundwater.

Based on the test results, it is anticipated at this time that enhanced anaerobic bioremediation (EAB) would be utilized to treat the contaminants in the northern portion of the plume and that in-situ chemical oxidation (ISCO) would be used on the southern portion. To arrive at the cost estimates provided above, the following assumptions were made in the FS:

Northern Area

- Treatment using EAB through the injection of lactate into the till aquifer;
- 51 injection wells were assumed, with 9 to be located on-property and the rest located off of the former SCP property; and

- Off-property injections of lactate were assumed to occur quarterly for 5 years, while on-property injections were assumed to continue for up to 30 years.

Southern Area

- Based on the bench-scale tests that were conducted, treatment using ISCO through the injection of a combination of sodium persulfate and sodium hydroxide into the aquifer;
- 20 injection wells were assumed, with 7 to be located on-property and the rest off of the property; and
- A total of 3 injections were assumed, over a period of 3 to 5 years.

The details of the in-situ treatment technology to be used in each area, including the substances to be injected, the number of injection points, the extent of the treatment zone, and the timeframes for treatment, would be refined during the remedial design, and may change significantly based on the final results of the pilot study and results from the pre-design investigation. However, the use of an in-situ treatment technology or technologies is expected to remain an appropriate remedy for OU3.

After the initial treatment period, monitored natural attenuation (MNA) would be used to complete the remediation of OU3 groundwater. MNA addresses contaminated groundwater through ongoing natural attenuation processes accompanied by verification monitoring. By EPA's definition, MNA utilizes natural in-situ processes to reduce the mass, toxicity, mobility, volume, and/or concentration of chemicals through biodegradation, dispersion, dilution, sorption, volatilization, and/or chemical or biological stabilization, transformation, or destruction of contaminants. The primary in-situ process contributing to the ongoing natural attenuation that has been documented for the contaminants present in OU3 is biodegradation (i.e., the natural breakdown of chemicals through biological processes). Multiple lines of evidence exist which show that natural attenuation processes are occurring.

Institutional controls would also be part of this alternative. A deed notice is already in place which restricts the placement of groundwater wells on the former SCP property itself. In addition, a Classification Exception Area/Well Restriction Area (CEA/WRA) would be established to prevent the installation of wells within the affected area until the remediation is complete.

Alternative 3 – Groundwater Extraction and Treatment, Monitored Natural Attenuation, and Institutional Controls

Total Capital Cost	$1,972,573
Total Operation and Maintenance	$15,747,600
Total Present Worth Cost	$11,140,000
Estimated Timeframe	30 years

In this alternative, contaminated groundwater from OU3 would be extracted, treated on-site, and then disposed of off-site. Detailed modeling would need to be conducted during the design to determine, for example, where to place the extraction wells, how many to place, and how to treat the contaminated water. However, to arrive at the cost estimates above, it was assumed that five extraction wells screened in the till unit to just above bedrock would be needed. Three would be located in the northern area and two would be placed in the southern area. All wells were assumed to pump at a rate of two gallons per minute.

Separate processes would be needed to treat the water contaminated with 1,4-dioxane from the water contaminated with other VOCs only, since 1,4-dioxane is both much more soluble in water and does not adsorb as readily to carbon as the other VOCs present in the groundwater. Disposal of the water would be either directly to a surface water body or to a publicly operated treatment facility.

As with Alternative 2, MNA would be used to address contamination outside of the extraction zone, which would be refined during the remedial design, and institutional controls would be used to assure that the alternative remains protective while the remediation is being completed.

EVALUATION OF ALTERNATIVES

EPA uses nine evaluation criteria to assess remedial alternatives individually and against each other in order to select a remedy. The criteria are described in the box on the next page. This section of the Proposed Plan profiles the relative performance of each alternative against the nine criteria, noting how it compares to the other options under consideration. A detailed analysis of each of the alternatives is in the FS report. A summary of those analyses follows.

Overall Protectiveness of Human Health and the Environment

Alternative 1 (no action) would not provide protection of human health and the environment in the long term, since contamination would persist in the groundwater. Alternative 2 (in-situ treatment) and Alternative 3 (ex-situ treatment) would eliminate risk through treatment or removal of the contaminated groundwater in the long term, and would be protective in the short term through the placement of institutional controls. Both would comply with the RAOs.

Since Alternative 1 is not protective of human health and the environment, it is eliminated from consideration under the remaining eight criteria.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

Alternatives 2 and 3 will comply with ARARs over time. Both would comply with chemical-specific ARARs through either treatment or removal of contaminated groundwater, though Alternative 2 would likely achieve chemical-specific ARARs faster than Alternative 3. Similarly, both alternatives would meet action-specific ARARs, though due to the need for disposal of treated groundwater, it would be much more difficult for Alternative 3 to meet them.

Long-Term Effectiveness and Permanence

Both alternatives would provide long-term effectiveness and permanence, since under both alternatives the impacted groundwater would either be treated or removed. Both would require long-term monitoring until ARARs are achieved, though Alternative 3 would likely require a longer active treatment time.

Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative 2 would reduce the toxicity, mobility, and volume of contaminants in the groundwater through treatment. The treatment would degrade contaminants to less-toxic forms, thereby reducing both toxicity and volume, and would reduce mobility through direct source control. Alternative 3 would reduce both the mobility and volume of contaminants in the groundwater, but would not enhance the reduction of toxicity in-situ that is already occurring through natural attenuation processes.

THE NINE SUPERFUND EVALUATION CRITERIA

Overall Protectiveness of Human Health and the Environment determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.

Compliance with ARARs evaluates whether the alternative meets Federal and State environmental statutes, regulations, and other requirements that pertain to the site, or whether a waiver is justified.

Long-term Effectiveness and Permanence considers the ability of an alternative to maintain protection of human health and the environment over time.

Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.

Short-term Effectiveness considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation.

Implementability considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.

Cost includes estimated capital and annual operations and maintenance costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.

State/Support Agency Acceptance considers whether the State agrees with the EPA's analyses and recommendations, as described in the RI/FS and Proposed Plan.

Community Acceptance considers whether the local community agrees with EPA's analyses and preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance.

Short-Term Effectiveness

Both alternatives would have some impact to the community during pre-design investigations. The impacts to the community posed by Alternative 2 would be low. Periodic access to some properties would be needed to complete injections during the active treatment period and during the long-term monitoring of wells. Alternative 3 would have a much greater impact on the community due to the need to construct a treatment plant and a groundwater extraction and discharge system. Since a conveyance system to carry the water from the extraction wells to the treatment system would need to be installed, including along roadways and utility corridors, construction of the system would impact both public and private properties

Implementability

Alternative 2 is readily implementable. The materials needed are generally available and only limited access will be needed to properties near the Site. Alternative 3 is also implementable, but it would pose a greater challenge to implement than Alternative 2. While the materials needed should be readily available, more invasive access will be needed to properties to install pipelines and extraction wells.

Cost

Alternative 3 has a slightly higher capital cost than Alternative 2 due to the need to construct a groundwater extraction and treatment facility. Alternative 3 also has a significantly higher operations and maintenance cost than Alternative 2.

State/Support Agency Acceptance

The State of New Jersey agrees with the preferred alternative in this Proposed Plan.

Community Acceptance

Community acceptance of the preferred alternative will be evaluated after the public comment period ends and will be described in the ROD for the Site.

SUMMARY OF THE PREFERRED ALTERNATIVE

The Preferred Alternative for cleanup of the OU3 groundwater at the SCP Site in Carlstadt, New Jersey is Alternative 2, In-Situ Treatment, Monitored Natural Attenuation, and Institutional Controls.

In-situ treatment of various contaminants has worked successfully at other sites, and results of bench-scale and pilot-scale tests conducted at this Site indicate that in-situ treatment options should be available to effectively treat the contamination present at this Site. As part of the remedy, monitored natural attenuation will be conducted during and after treatment and institutional controls will be maintained to assure the remedy remains protective until cleanup goals are met.

EPA believes the Preferred Alternative will be protective of human health and the environment, will comply with ARARs, will be cost effective, and will utilize permanent solutions and alternative treatment technologies to the maximum extent practicable. Through the use of an in-situ treatment technology to treat the groundwater, the Selected Remedy meets the statutory preference for the use of remedies that employ treatment that reduces toxicity, mobility or volume as a principal element to address the principal threats at the Site. The Preferred Alternative can change in response to public comment or new information.

Consistent with EPA Region 2's *Clean and Green* policy, EPA will evaluate the use of sustainable technologies and practices with respect to any remedial alternative selected for the Site.

As is EPA's policy, Five-Year Reviews will be conducted until remediation goals are achieved and the Site is available for unrestricted use and unlimited exposure.

COMMUNITY PARTICIPATION

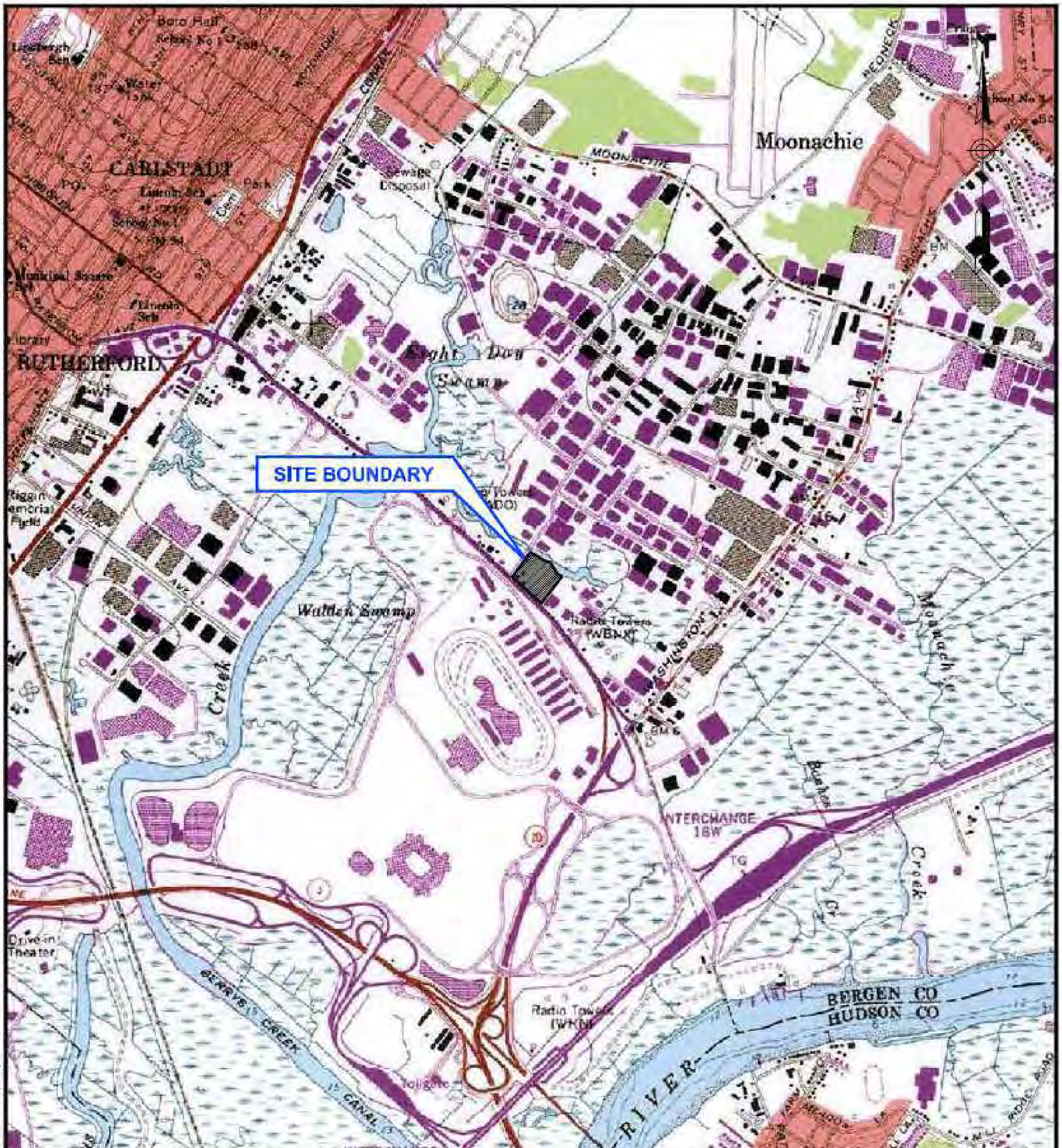
EPA provides information regarding the cleanup of the SCP Superfund Site to the public through public meetings, the Administrative Record file for the Site, and announcements published in the South Bergenite newspaper. EPA and NJDEP encourage the public to gain a more comprehensive understanding of the Site and the Superfund activities that have been conducted there.

The dates for the public comment period, the date, location and time of the public meeting, and the locations of the Administrative Record files, are provided on the front page of this Proposed Plan.

For further information on the SCP site, please contact:

Stephanie Vaughn Remedial Project Manager (212) 637-3914 vaughn.stephanie@epa.gov	Pat Seppi Community Relations Coordinator (212) 637-3679 seppi.pat@epa.gov

U.S. EPA
290 Broadway, 19th Floor
New York, New York 10007-1866



REFERENCES

1.) BASE MAP TAKEN FROM U.S.G.S. 7.5 MINUTE QUADRANGLE OF WEEHAWKEN, NEW JERSEY, DATED 1967 AND PHOTOREVISED 1981.

2000 0 2000
APPROXIMATE SCALE FEET

Golder Associates, Mt. Laurel, New Jersey	SCALE: AS SHOWN	TITLE	
	DATE: 05/04/12	**SITE LOCATION MAP**	
	DESIGN: HAL		
	CADD: AM		
FILE No. 9436222V018	CHECK: HAL		
PROJECT No. 943-6222 REV. 0	REVIEW: PSF	216 PATERSON PLANK ROAD SITE	FIGURE 1

Drawing file: 9436222V018.dwg May 04, 2012 - 12:04pm

ATTACHMENT B

PUBLIC NOTICE

EPA INVITES PUBLIC COMMENT ON A PROPOSED PLAN TO CLEAN UP THE SCIENTIFIC CHEMICAL PROCESSING SUPERFUND SITE IN CARLSTADT, NEW JERSEY

The U.S. Environmental Protection Agency announces the opening of a 30-day public comment period on a cleanup proposal to address on- site and off-site ground water contamination associated with the Scientific Chemical Processing Superfund site in Carlstadt.

Public comment on the preferred cleanup plan, and other cleanup alternatives that were considered, begins on August 2, 2012 and ends on September 4, 2012. The EPA encourages the public to attend a public meeting on Thursday, August 9, 2012 at 7:00 p.m.at the Carlstadt Borough Hall, 500 Madison Street, Carlstadt, N.J.

The Proposed Plan is available at http://www.epa.gov/region02/superfund/npl/scientificchemical or by calling Pat Seppi, EPA's Community Involvement Coordinator, at (212) 637-3679 and requesting a copy by mail.

Written comments on the Proposed Plan, postmarked no later than September 4, 2012, may be mailed to Stephanie Vaughn, EPA Project Manager, at U.S. EPA, 290 Broadway, 19th Floor, ATTN: Stephanie Vaughn, New York, NY 10007-1866.or emailed no later than September 4, 2012 to vaughn.stephanie@epa.gov,

The Administrative Record file, containing the documents used or relied on in developing the alternatives and preferred cleanup plan, is available for public review at the following information repositories:

Carlstadt Borough Hall, 500 Madison Street, Carlstadt, N.J.

U.S. EPA Region 2, Superfund Records Center, 290 Broadway, 18th Floor, New York, NY 10007-1866 (212) 637-4308, Mon. - Fri., 9am - 5pm

ATTACHMENT C

TRANSCRIPT OF PUBLIC MEETING

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
STATE OF NEW JERSEY
COUNTY OF BERGEN
BOROUGH OF CARLSTADT

--x

In the Matter of

Public Comment on the Proposed Plan for the Scientific Chemical Processing Superfund Site, Cardstadt, Bergen County, New Jersey

--x

Proceedings in the above-captioned matter held at the Carlstadt Borough Hall, 500 Madison Street, Carlstadt, New Jersey 07072-0466 on Thursday, August 9, 2012, commencing at 7:10 p.m.

A P P E A R A N C E S:

STEPHANIE VAUGHN
Project Coordinator
(212) 637-3914
vaughn.stephanie@epa.gov
U.S. EPA
290 Broadway, 19th Floor
New York, New York 10007-1866

PAT SEPPI
Community Relations Coordinator
(212) 637-3679
seppi.pat@epa.gov
U.S. EPA
290 Broadway, 19th Floor
New York, New York 10007-1866

MARION OLSEN
Risk Assessment

STEVE FINN
Project Coordinator

SPEAKERS FROM THE COMMUNITY:

Joseph Guarnaccia

Mayor William Roseman

Reported By:

Donna Lynn J. Arnold, CCR

3

MS. SEPPI: Well, I'd like to thank everyone for coming tonight. We really appreciate you coming out.

The reason that we're here tonight is to talk about the proposed plan which is EPA's preferred alternative to clean up the groundwater, the Scientific Chemical Processing Site. So after this, if I call it SCP, I think you'll know what I mean.

Stephanie will be talking about some of the site history, giving you an overview of what's going on, what's gone on in the past, different alternatives that we have looked at and why we came up with the alternative that we have decided.

So, my name is Pat Seppi. I'm from the Public Affairs Office in EPA and I'm the Community Involvement Coordinator for the site.

And, I would like to ask my colleagues to please stand up and introduce themselves.

Stephanie.

MS. VAUGHN: Hi. My name is Stephanie Vaughn. I am the Project Manager for the site, Scientific Chemical Processing, SCP.

MS. OLSEN: Hello. My name is Marian Olsen. I'm the Risk Assessor for the site.

4

MR. FINN: I'm Steve Finn, I'm the

Project Coordinator.

MS. SEPPI: And, you'll notice that we have a stenographer here this evening. Her name is Donna.

And, because this is a public meeting, all your comments will be recorded and be made part of the record. And, then what happens after this, when we issue our final decision, which is called the Record of Decision, we'll also issue a responsive summary that will cover all the questions or comments that you had tonight. We will answer them if they're questions. But, they also have until September 4th, the close of business that day.

If you should think of anything else after this meeting, you can send any other comments that you have by that date to Stephanie. Or, if you know of anybody else who couldn't be here tonight, who might have some comments, please just have them send them to Stephanie also.

And, her information is on the proposed plan. And, it's probably on one of the slides, also.

What I'd like to do -- I mean if you have -- we have a small group. So, I'm not going to say please hold all your questions to the end. I

5

mean, I think we can make this very informal. So, if something comes up in the presentation and you have a question, please just raise your hand and we'll be glad to answer it.

All right. So, this is kind of our agenda.

As I said, Stephanie will do the site description and the history. There have been a lot of activities that have gone on at this site. And, I think Stephanie will summarize those, talk a little bit about the groundwater investigation and the preferred remedy and then, as I said, please jump in at any time if you have a question.

This I'm going to go through very quickly. This is a Super Fund process. You probably all know it. But, it just kind of shows you where we are right now.

You know, we were -- there was a site discovery. We did a whole lot of investigating and sampling. And, that's part of the remedial investigation. And, then we take all that information from the remedial investigation and we put it in what's called a Feasibility Study or an FS. And, that's a list of alternatives that have been developed from the information that we found in the

6

remedial investigation.

So, this is where we are now, at the public comment stage. We have 30 days for public comments and then we'll issue what I said was the

Record of Decision. That's our legally binding document that actually states exactly what our remedy is going to be. And, after that, it goes into design and then remedial action when it actually gets implemented. And, that's very quick for the process.

So, I think now I'll turn it over to Stephanie.

MS. VAUGHN: Right. Thank you, Pat.

And, hi, everyone. I'm just, if I'm not speaking loud enough, let me know. I won't be offended.

I'll, I'll quickly run through the site descriptions since I think most folks here are probably, are pretty familiar with the site.

The site itself consists of both the former Scientific Chemical Processing facility where that was located plus the groundwater that's associated with the activities that occurred on that property.

And, it is a 6 acre property that's located at the corner of Paterson Plank Road and

7

Gotham Parkway in Carlstadt. And, it's bordered by Peach Island Creek to the northeast and a trucking company to the southeast and, or to the southwest and it's in a generally light industrial commercial area.

This figure -- where did the -- did you take the pointer?

MS. SEPPI: Sorry.

MS. VAUGHN: That's okay.

Here is the site. This is, I believe, where Borough Hall is. This is where we are right now. Here is the creek.

This next slide shows a blow-up of the site and the roads, just to put things in perspective.

And, over here is MetLife Stadium and the grounds of the stadium.

So, how does this site get contaminated? The property was used as a solvent and industrial waste refining and recovery facility for many years from approximately the '40s to approximately 1980 when it was shut down.

The Scientific Chemical Processing Company actually acquired the site in 1971. And, that's where it got its name.

It was placed on the National

Priorities List which is basically a list of Superfund sites that EPA is in charge of addressing and cleaning up, in 1983. And, EPA has been actively involved with this site since 1985.

We, very early on in the process, sent notice letters to 140, what we call potentially responsible parties. Those are companies that we believe, through our review of the records, that contributed to the waste at the site. And, they are legally responsible to help in the investigation and cleanup of the site.

So, these parties -- this group of potentially responsible parties initiated the investigation of the entire site in 1987.

The site is divided into two study areas. There is the soil on the property itself and the associated shallow groundwater. And, then there is the deeper groundwater that is under and off of the property.

So, just to be clear, this is the property. I'll go into this in more detail but the ground water is contaminated that way to the northeast and a little bit to the south here.

So, I'm just going to quickly go through some of the previous activities that have

9

happened at the site because there has been a lot.

In 1990, EPA selected an interim remedy to address the contamination on the site, soils and shallow groundwater.

We selected an interim remedy because we wanted to continue studying the site. But, the interim remedy included construction of a vertical containment wall around the perimeter of the contaminated area which basically means like a slurry wall.

We, adjacent to the Peach Island Creek, we also installed a sheet pile wall to prevent any groundwater from flowing in or out of the creek. Over the top of the contaminated area, we placed a cap to prevent water from infiltrating into the soil and the contamination from spreading and a ground water extraction system to remove the shallow groundwater contained within this system which, again, would prevent further migration of contamination off of the property. And, then we simply placed a fence around the property to restrict access and to monitor this remedy.

Construction was completed in 1992. And, the potentially responsible parties did complete all of the work.

The goals of the interim remedy, as I, as I alluded to were to prevent exposure to contaminated soil and to prevent the migration of contamination in the soil and shallow groundwater to the surrounding areas.

We monitored this remedy for many years and determined that it was effective, that there wasn't really something more aggressive that needed to be done to address the contamination.

As such, in 2002, we selected, EPA

selected a final remedy for the site which, in most ways, just simply included an upgrade of the 1990 interim remedy. But, it included two additional aspects. It included the removal of what we were calling a hot spot of contamination from the contaminated area. We actually excavated that and disposed of it off site and it also included the placement of a much more long term permanent cap over the contaminated area, what we call a two foot thick double containment cap with multiple layers to make sure it stays protective in the long term.

Construction of that remedy was completed about a year ago, in October of 2011. Again, it was completed by the responsible parties with EPA oversight and regular operations and

11

maintenance of that remedy is on-going.

So, that's where we, that's where we are in terms of actions at the site.

During all of this time, investigation of the groundwater, of the deep groundwater was still on-going. And, so we're here today to present our preferred remedy for addressing the deep groundwater contamination which remains on the site.

So, the bulk of this site related contamination has already been addressed. The site is protected. There is no exposure to contamination either on the property itself or off of the property.

R2-0002893

But, in the long term, we need to do something to clean up the remaining contaminated groundwater.

So, as I just said, we've been monitoring the groundwater since 1987. Interim reports have been submitted over the years. Every time we get a new piece of information, it kind of leads you to say, okay, we see something over here, let's install another well there. And, we finally, by 2009, felt comfortable in our understanding with what's going on at this site, that there is some contamination in the deep groundwater in the vicinity of where the SCP or Scientific Chemical Processing facility operated.

12

In 2008, a report was also submitted which identified a preliminary list of approaches for addressing this contamination. So, since, for the past four years or so we've been studying how best to address this contamination.

But, before I get to that, before I get to what contamination there is and how we're going to address it, one of the questions that EPA needs to answer is, do we need to do anything, is there a risk posed by this contamination. And, EPA has what we call a risk assessment process.

To put it simply, basically in order for there to be a risk, you need to have something that is toxic, something that is dangerous which pretty much anything can be dangerous in the right or the wrong concentrations. And, you need to have an exposure. And, then those two things together form a risk.

So, if there is contamination in the groundwater but nobody is being exposed to it, there is no risk.

So, we evaluate both current conditions and future risk potential conditions.

So, in this case, with the deep groundwater, the public is not currently exposed to

13

groundwater contamination from the site. So, therefore, there is no current risk. And, that is why I said that this site is currently protected.

However, in the future, in the State of New Jersey, all water is potentially, has the potential to be used as a drinking water source and must be treated as such. So, therefore, in the future, there is the potential that residents may use this water as a drinking water source. And, we ultimately want to clean that water up so that it is available for a drinking water source.

So, we evaluated the risk to potential future residents and businesses in the area. And, we found that, again, for potential future exposures, both cancer risks and non cancer health hazards exceed acceptable levels, EPA's acceptable levels. And, so, therefore, action is needed and warranted at this site.

And, the primary contaminants of concern at this site whether causing the most risk are what we call chlorinated solvents, primarily trichloroethylene and tetrachloroethylene. You may have seen TC and TCE, they're solvents in the northern area of the site and another solvent called 1,4 dioxane in the southern area. And, I'm making

that distinction in a moment.

So, this figure shows this site and the area of where we found the groundwater contamination.

Here is the site. Groundwater generally flows in this direction. So, it goes from the site out this way. And, these blue lines are what we call, they're basically showing areas of equal concentration.

So, right in here we have high, relatively high levels of contamination. And, as we move away from this site, the concentrations decrease.

So these -- you probably can't read the number but they are, they correspond to the total concentration of volatile organic compounds. And, within -- this is about a thousand feet which is less than a quarter of a mile. So, within a thousand feet concentrations basically decline to levels just above those of concern; and, the shell in the, and in parts of the groundwater and in the deeper bedrock portion of the groundwater they actually are below our levels of concern.

So, the area of contamination to the north is relatively small and relatively well-contained already.

In addition, over here, to the south, we have, we found some high concentrations of this other contaminant called 1,4 dioxane. It seems to be located primarily close to that corner of the site.

And, the reason I'm making that distinction is because, depending on what remedy we end up selecting, that, that contaminant may need to be addressed differently than the other contaminants that are present.

So, just to, just to show what we're talking about with the deep groundwater, this is a -- pretend you took the site and took a slice into the ground. Here is the site itself. These red lines represent the slurry wall that surrounds the site vertically and prevents contamination from moving off of the property. Those -- that slurry wall is, ties into this clay layer here.

So, clay, if you can picture clay, you

know, that you played with when you were a child, perhaps, is a very thick substance and ground water and contamination don't readily move through it. So, it's what we call a confining layer. Not much contamination is going to go through that.

So that, the contamination that we're discussing today, that we're proposing a plan to

□

16

address is the, the relatively small amount that made it through that clay layer in the past and into this, this deeper, these deeper layers.

That's all I'm going say on that. But, if anybody wants to discuss it further, I'm happy to.

So, there are certain goals of any remedy. The goals of this remedy that we're proposing for the deep groundwater are to prevent potential future exposures to the impacted groundwater, to control future migration of contaminants of concern in the groundwater. So, I show those blue lines. We don't want those to move further away from the site. We want them to shrink.

And, we ultimately want to restore the groundwater quality to drinking water so it's acceptable as a drinking water source.

So, we've evaluated three options to clean up this groundwater. The first alternative we evaluated, there is no action that is mandated by

Superfund law, just to kind of give us a base line.

As I said before, there is a risk so no action is not protective and we're not going -- we didn't evaluate that further.

Alternatives 2 and 3 have a lot of components in common. They both include what we call

monitored natural attenuation and they both include institutional controls. I'll explain what that is in a moment.

Alternative 2 would treat the groundwater in situ which means they would treat the groundwater in the ground. We wouldn't take it out. We would instead put something into the ground in order to break down the contaminants.

Alternative 3 would take the groundwater out of the ground and treat it in some sort of treatment facility.

I just started going through this but in situ treatment is treating contamination in place. There are two general forms of in place treatment. You can either enhance natural biological processes that occur naturally or you can actually help the chemical breakdown of contaminants to occur.

And, the goal is to transform the contaminants to non toxic forms. And, that's as opposed to an ex situ treatment when you're extracting the groundwater. Monitored natural attenuation means that the contaminants naturally through, there are bugs and stuff in the water that will break down contaminants. And, that happens regardless of what you do.

In some areas that happens quickly, in some areas it happens not so quickly or not at all.

So, we did evaluate this site. We did a lot of testing to see if natural attenuation was occurring on its own and it is occurring. So, you can monitor that to make sure it continues to occur and that it is occurring at a rapid enough pace to be effective.

Finally, the term institutional controls simply refers to things like fences and well restriction areas and things like that.

So, we basically needed to evaluate, do we want to treat the groundwater in the ground or out of the ground. The Superfund process has -- Superfund has a process for evaluating alternatives. We call it the nine criteria.

There are two threshold criteria that any remedy must meet, must be protective of human health in the environment. That is our ultimate goal and must comply with regulations.

Once you meet those threshold criteria, then we look at a bunch of other things to determine, to kind of weigh the pros and cons and determine which remedy we think we should go with.

So, I'll go through these quickly.

Both Alternatives 2 and 3 are protective, would be protective of human health in the environment. They would address the contamination. They would both comply with standards but, Alternative 3, extracting the groundwater would likely take longer to achieve our goals than treating the groundwater in place.

The, the next -- the first of the balancing criteria is long term effectiveness. That means, you know, in the long term will this remedy remain protective, will it, will it -- that's basically it.

And, again, both would be protective in the long term but Alternative 3 would get there faster, most likely. Meaning that concentrations of contaminants in the groundwater would be reduced to drinking water standards in a shorter time frame.

And, and just to be clear, both of these remedies do have a longer -- do have a very long time frame.

The next, the next criteria is reduction of toxicity mobility or volume. Both alternatives would reduce the mobility and volume of contamination. But, only Alternative 2, where we're actually treating the contaminants in the ground, would reduce the toxicity of the contamination in the

ground. The other would remove the volume but the toxicity would be reduced outside of the ground. And, there is a preference for treatment in place.

In the short term, this is a big difference between the two remedies. The, the in situ treatment would be very easy to implement, relatively easy to implement. It involves setting up well points in order to place the substances into the ground that would aid in the cleanup of the contaminants. And, we would have to periodically go out and, and maintain those and add more.

Whereas, the extraction alternative would require the building of a treatment plant as well as pipelines throughout this, this highly developed, heavily developed area. And, so there would be a significant impact on the community through that construction. And, also, we would have to take up the property in order to treat the groundwater.

Cost, Alternative 2 does cost less than Alternative 3. And, the State, I'll, I'll say in a moment what our preferred alternative is but the State has agreed, agrees with our choice of preferred remedy.

And, community acceptance is the last

of the criteria. And, that is an important piece of it. And, that's why we're here tonight. And, that's why we have this public comment period. So, please offer your, your comments and your questions.

And, if something were to come out during the public comment period that would cause us to change our, our thoughts on what the preferred remedy is, then we would, then we would make that change.

So, our preferred remedy to treat the deep groundwater is the in situ treatment with monitored natural attenuation and institutional control.

Over these years that we've been studying this site, we have conducted first bench and then pilot scale studies.

What that means is, a bench scale study is basically we take some of the contaminated groundwater, we bring it to a lab and we run tests on it to see if we can break down the contaminants. But, if that is successful, then we might go a pilot scale study where we actually do something in the field but on a smaller scale than treating the entire area just to see -- we want to make sure that whatever we select is actually going to be effective.

So, what we found through those studies is that for the -- I'm going go to the next slide -- for this portion of the contamination, which is the majority of it, we, at this time, think that enhanced anaerobic biodegradation will be effective which basically means that we'll add lactate is our current thought, although that could change during the design, into the ground and the lactate provides food basically for the micro organisms that live in the groundwater that eat the contaminants and break it down to an or through -- break down the contaminants to less toxic forms.

Our testing also indicates that, in this area, where the 1,4 dioxane is present, 1,4 dioxane will not respond to biodegradation. So, there we're proposing, at this point, to do chemical oxidation which is the other side of the in situ treatment process basically using chemicals to break down the chemicals using, using non toxic chemicals to break down the toxic chemicals to other non toxic chemicals.

These dots indicate preliminarily where we would be placing, in this case, the lactate or here, the chemicals, most likely potasium persulfate into the ground.

And, so, this, for example, is the treatment area. And, then, by treating that area, the most heavily contaminated, the highest concentrations, rather, of contamination concurrently with the natural attenuation that is already occurring, that those two things combined will effectively clean up the groundwater.

As I've said, the remedy is already -- the site is already protective. Nobody is exposed to this groundwater.

In order to assure that that remains so, we will work with the State of New Jersey to ensure that what we call a classification exception area is placed around the contaminated area so that absolutely nobody could install a well in this area until drinking water standards are met. And, we will continue to monitor the site over time to make sure all is well.

And, that is basically it.

As Pat said, a public comment period runs through September 4th.

I'll leave this slide up. This is our contact information. There's also a website where you can find information about this site.

And, now I talked a lot. So, if anyone

24

has any questions, please feel free to ask.

MS. SEPPI: Yes, Joe.

MR. GUARNACCIA: Joseph Guarnaccia, G U A R N A C C I A.

And, my fundamental question is the, tell me what the purpose of this remedy is. You keep saying that there is no, there are no exposure pathways at the moment. You could put a CEA on this thing. You can monitor it. You could ensure that its boundaries are not growing but yet you want to $8,000,000 in the ground to get to what point?

What is the point of this remedy?

And, in particular, let me just say -- well, one fundamental question is, are you going after source material or is this a dissolve plume that you just want to accelerate to closure.

Is that it?

MS. VAUGHN: It's twofold. As you can see here, some of the injection points are within the contaminated area. So, this is within the capped area.

So, we are going to be going within the contaminated area to help contain the plume of contamination.

MR. GUARNACCIA: Right.

MS. VAUGHN: The goal is a remedy and is really to restore the groundwater to --

MR. GUARNACCIA: To accelerate

restoration.

MS. VAUGHN: To accelerate restoration and restore it to drinking water standards.

MR. GUARNACCIA: What kind of time frame, like without remedy, with remedy?

What are the time frames you're talking about?

MS. VAUGHN: With remedy, it's probably on the order of 30 years.

MR. GUARNACCIA: And, without?

MS. VAUGHN: Without, I, I -- Steve, do you happen to know?

MR. GUARNACCIA: Forever? Okay. It might as well be forever.

MS. VAUGHN: It would be, it would be much longer. I mean, it would.

MR. GUARNACCIA: It just seems -- I realize the State has a mandate that all the waters should be considered drinking water, drinking waters.

But, you look at this area, highly industrialized. Nobody should be putting a well in the top hundred feet of this aquifer in the first

place. If you want water, go drill deeper. And, that's certainly what everyone should be thinking about.

And, I would think there's better uses of $8,000,000 than putting it into a ground to get to what point? I mean, to increase, to decrease you from, from 50 years down to 30 years of restoration?

I, I just wonder the merits of something like this.

You put the cap on. You've eliminated water contact with what's remaining. You've got as much as you can get out of there, feasibility wise. So, now you've got this, this legacy plume that's out there that's, by definition, depleting with time because there's no source.

There is natural biology that's going on. Natural monitored attenuation is an appropriate remedy.

So, you want to -- I don't -- you know what, it's a tough one for me.

MS. VAUGHN: I understand what you're saying. The costs, just for what it's worth, the up front capital costs are much lower. The, the total cost includes the 30 years of monitoring.

MR. GUARNACCIA: And, how about

regionally, are there other sources of contaminated groundwater?

Are we cleaning up this groundwater or are you cleaning up this groundwater?

And, so we'll remove this plume but yet right next door there's yet another plume that you can't drink the water anyway.

Does that have any factor?

MS. VAUGHN: It does. I mean we, we're monitoring this groundwater and we're cleaning up the concentrations that we're seeing. And, concentrations are declining which indicates that there isn't another plume that is kind of superseding them.

MR. GUARNACCIA: Maybe not right here but maybe half a mile away.

MS. VAUGHN: There are other sites in the area and those are being addressed.

MR. GUARNACCIA: So, it isn't reasonable to think that this is a drinking water aquifer, just by its setting, its industrial setting. Maybe the town can use this money as opposed to throwing it in the ground.

It's a bizarre concept but there's a lot of off, a lot of pollution sources in this area.

28

And, to clean this one up and let the other one go on polluting, I don't see the benefit. I just don't see the benefit.

MS. SEPPI: You would have thought that no action would be --

MR. GUARNACCIA: I'm not saying no action. I'm saying keep monitoring it for sure.

By the way, the only way you're going

to understand what's going on here is monitoring the time. You can't take a snapshot and say I understand what's going on here.

You got to look at the trends and see if what you think, your conceptual site model is what, is what I think, is it true? Time will tell.

You can continue to monitor these wells that are out there. You've got permanent wells in there. And, you can monitor the trends and there's also trends of going down. That's really what you're looking for.

And, so, and there's no guarantees by -- by implementing this strategy, you are not a guaranty, you're not going to get to drinking water levels because biology doesn't, they'll eat so long as there's food there.

And, this, you know, how low does

29

that -- what's a reasonable, what's a reasonable concentration that the biology can be sustained? Do you know?

MS. VAUGHN: I, I mean --

MR. GUARNACCIA: 10 PPB.

MS. VAUGHN: For a total, it depends.

MR. GUARNACCIA: What's the drinking water standard for PCE, is it seven in the State?

MS. VAUGHN: 10, I think. I, I have it

in the report over there. No. Wait. It's right here. It's holding up my...

MR. GUARNACCIA: Anyway, the key point is that biology is not going to get you to zero. So, you're going to have to rely on MNA to begin with. And, it's well-known in the science that getting from 10 down to one is an exponential increase in time simply because of the, of nature, the physics of the problem.

These contaminants defuse into the bedrock, believe it or not. And, as you clean up the easy stuff, the stuff that's defused deep into the bedrock will now start bleeding out. And, you will get one, two, 10 PPB forever.

So, if that's what you're going for, then there's no reason to bother.

MS. VAUGHN: Well, fortunately, the bedrock concentrations are already below drinking water standards.

MR. GUARNACCIA: So, this is all in this consolidated overgrowth?

MS. VAUGHN: Yes. It's not attraction of bedrock issue. It doesn't appear to be.

MR. GUARNACCIA: It doesn't. That's good. Well, all right.

MS. VAUGHN: Which makes it a little more hopeful.

MR. GUARNACCIA: You can call it an aquifer. It's actually conductive enough to support production of water and that's the definition of an aquifer.

MS. VAUGHN: And, that's why we did the pilot tests, honestly. We wanted to make sure that doing something active other than a monitoring natural attenuation would even be effective. And, the tests show that it would be.

And, as you said, you're right, it needs to be monitored. We've been monitoring the groundwater since 1983. That's how we got to this point.

I, I guaranty that the potentially

31

responsible parties, if they find that the treatment is not being effective, they will, they will let us know and we will find out and they would petition to, to stop it.

I mean, I don't think anybody wants to throw good money after for no use.

MR. GUARNACCIA: Well, right. Study the results and that makes you smarter. All right.

Well, this is better than punk treatment. That's not going to get you anywhere.

MS. VAUGHN: No.

MR. GUARNACCIA: It's all about

contact. And, you got it. I guess that's why you have so many injection points. You got to get these amendments where you need them.

MS. VAUGHN: And, this is just preliminary. It still needs to complete the design.

MR. GUARNACCIA: And, the difference between dioxane and these other compounds -- I mean, why can't -- dioxane doesn't degrade biologically?

MS. VAUGHN: No. And, I'm not a chemist so I can't answer that question of why.

I don't know -- Steve, do you know why?

MR. FINN: It's actually very recalcitrant for that information. There's so many

32

problems with it. That's why it was used as a stabilizer for some chlorinated solvents and it doesn't degrade.

There's some research going on that may find ways to biodegrade it. But, nothing has gotten out of the labs so far.

MR. GUARNACCIA: There's only dioxane in that corner? Are there other compounds?

And, it seems odd that you'd have -- are you sure that's coming from this site? It's not coming from across the street?

MS. VAUGHN: There are other compounds in that corner, the other CC, PC.

MR. GUARNACCIA: And they will be

effected by the chemical oxidation, I guess?

MS. VAUGHN: They would be but I think the M and A will be the primary -- well...

MR. FINN: Chemical oxidation will get it, will oxidize whatever it will oxidize. If chlorinate is there, it will get it.

MR. GUARNACCIA: Right.

MS. SEPPI: Thank you for your comments.

Anybody else have questions?

MAYOR ROSEMAN: William Roseman, R O S

33

E M A N.

First, Stephanie, I want to thank you for all your help during the course of this project. Any time a question arose, you were always here and we appreciate that.

MS. VAUGHN: Thank you.

MAYOR ROSEMAN: Just for clarification purposes, the gentleman mentioned about the cost that's not being born by EPA or by taxes. That's being born by individuals.

MS. VAUGHN: Yes.

MAYOR ROSEMAN: So that answers that.

So, my question really is, I sat in this room, it could have been maybe more than 25 years ago, when they were talking about what they

R2-0002914

were going to do and how they were going to clean up the property. And, ultimately, it was very different, what they said they were going to do and what they actually did.

I mean, I'm not an engineer or, or environmental scientist. I don't know whether one is better than the other.

But, my question is, I've been on that site on several occasions and I spoke to an individual who I believe was an engineer. I don't

□

remember -- do you remember his name? Ronnie?

MS. VAUGHN: Ronnie V..

MS. SEPPI: From the Corps of Engineers.

MS. VAUGHN: Yes.

MAYOR ROSEMAN: And, he was explaining to me that they were going to build a pumping station there and that that was, you know, that they would draw the water out of the ground and then clean it up and then put it back down.

MS. VAUGHN: That, that actually was never something that we were, that we seriously considered. I think maybe perhaps what he was talking about is part of the on-property remedy. We do have a groundwater extraction system but it's not like a treatment system where basically we have this, effectively a box around the contaminated material on the property and there is water in that box. So, we extract that water and put it, bring it to a tank where we dispose of it off site. So, that's --

MAYOR ROSEMAN: Okay.

MS. VAUGHN: Yes. That will be going on.

MAYOR ROSEMAN: I didn't realize that.

MS. VAUGHN: That's that little

35

building on the northwest corner of the site.

MAYOR ROSEMAN: A reporter called me about it yesterday and asked me and I was like, well, officially they said they were going to do this. I didn't realize I was giving bad information. But, I didn't realize that it was the same thing.

MS. VAUGHN: I think that's probably what it is.

MAYOR ROSEMAN: And, the Borough, as you know, now owns that property.

When do you think we'll be able to use it?

MS. VAUGHN: Well, I, I think -- I mean, we've been saying to you for years, I know we've been talking and that's been your concern. The public comment period has to end.

Assuming we go with this remedy of in situ treatment, we would need to design the remedy and see how much of a footprint of the property we need in order to complete and then continue the remedy. But, it should be relatively small as compared to a pump and treat type system.

So, I think, you know, with the understanding that we would need continued access to the property indefinitely, we're closer to a point --

I'd say within -- I don't know how long till we have, we're comfortable with the design. But, I'd say, within the next year or so we should have a better feeling of, of how the property can be used and how much of it will be available.

MAYOR ROSEMAN: It's like -- I mean, I shouldn't say this. I should consider off the record right now.

But, what we were thinking about potentially using it as a park and ride, with the Super Bowl coming, as an income producing property for the Borough.

But, it looks like as though we might not be able to do that for the Super Bowl.

MS. VAUGHN: I don't know. Maybe not for this Super Bowl but maybe the next one.

MAYOR ROSEMAN: Thank you very much.

MS. VAUGHN: Okay.

MAYOR ROSEMAN: I have another meeting at 8 o'clock so I'll have to leave. But, thank you.

MS. VAUGHN: Okay. Well, thank you.

MS. SEPPI: Any other questions?

Okay. Well, again, thank you very much for coming.

If you have more comments, please, you

can always e-mail them or call Stephanie with them.

And, thank you. We'll be in touch soon.

MS. VAUGHN: Thank you all.

(The hearing concludes at 7:55 p.m..)

C E R T I F I C A T E

I CERTIFY that the foregoing is a true and accurate transcript of the testimony and proceedings as reported stenographically by me at the time, place and on the date herein before set forth.

I DO FURTHER CERTIFY that I am neither a relative nor employee nor attorney or counsel of any of the parties to this action, and that I am neither a relative nor employee of such attorney or counsel, and that I am not financially interested in this action.

______________________ ______
DONNA LYNN J. ARNOLD, C.C.R.
LICENSE NO. XI00991
MY COMMISSION EXPIRES 08/04/14

ATTACHMENT D

WRITTEN COMMENTS

Cleanup at Scientific Chemical Superfund Site in Carlstadt, New Jersey
Roger Lamb
to:
Stephanie Vaughn
08/08/2012 09:58 PM
Hide Details
From: Roger Lamb <RLamb@otek.com.au>

To: Stephanie Vaughn/R2/USEPA/US@EPA

History: This message has been forwarded.

1 Attachment

image002.jpg

Hello Ms. Vaughn my comment remediation for this site using ISCO is make sure a state-of-the art assessment of the VOCs in 3D (using direct sensing tools) has been performed and that the data collected from the investigations has been thoroughly analysed using software similar to that used by Principia Mathematica (ww.prinmath.com) or there is a greater risk the ISCO will fail due an under-estimation of the mass, volume, and distribution of the VOCs in the subsurface. If only soil borings and monitoring wells have been used thus far for site characterization I am afraid to say the ISCO will surely fail.

Cheers

Description: OTEK-Logo-Full-

Roger Lamb
Principal Environmental Scientist
T +61 3 9095 1900 **D** +61 3 9095 1914 **F** +61 3 9593 8555
A Level 1, 222 St Kilda Rd, St Kilda VIC 3182
E rlamb@otek.com.au
M +61 418 453 698
W www.otek.com.au

National | Melbourne | Sydney | Brisbane | Perth | Adelaide | Beijing

********************** ATTACHMENT NOT DELIVERED ******************

This Email message contained an attachment named
  image001.jpg
which may be a computer program. This attached computer program could
contain a computer virus which could cause harm to EPA's computers,
network, and data. The attachment has been deleted.

This was done to limit the distribution of computer viruses introduced
into the EPA network. EPA is deleting all computer program attachments
sent from the Internet into the agency via Email.

If the message sender is known and the attachment was legitimate, you
should contact the sender and request that they rename the file name
extension and resend the Email with the renamed attachment. After
receiving the revised Email, containing the renamed attachment, you can
rename the file extension to its correct name.

For further information, please contact the EPA Call Center at
(866) 411-4EPA (4372). The TDD number is (866) 489-4900.

********************** ATTACHMENT NOT DELIVERED **********************

R2-0002923